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ABSTRACT

This report is the fourth from the Competent Children project that is following a sample of children in the Wellington region of New Zealand from their early education experience into adulthood. The main aim of the project is to chart the contributions to children's progress made by family resources, early childhood education, school experiences, children's interests and activities in the home or outside school, and peer relationships. This report describes the children's progress and lives at the age of 10 years in 10 areas of knowledge, skill, and dispositions: (1) literacy; (2) mathematics; (3) communication; (4) perseverance; (5) social skills with peers; (6) social skills with adults; (7) individual responsibility; (8) logical problem solving; (9) curiosity; and (10) fine motor skills. Among the main findings were that most children were comfortable in their school environment, were good at making and keeping friends, needed adult intervention to work with other children over a period of time, and had progressed in reading and problem solving. Children starting school with low competency were more likely to improve if their parents were highly educated or if their family had a high income, while high-achieving students maintained their achievement level. Other factors considered as possible contributions to children's performance were early childhood education experience, school experiences (school and class characteristics, teacher perspectives, school attitudes, communication with parents about school, school attendance and mobility), gender, having English as a first language, family resources/characteristics (family type and stability, income source, parental employment, ethnicity, family income, parent education), and children's interests and activities (academic-related, leisure). The report's

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conclusion notes that adult responsiveness to children, warmth, fairness, and the inclusion of some cognitive content in the interaction ensured supportive interactions between children and the adults in their lives. The report's five appendices include descriptions of data analysis and results as well as a discussion of the selection of a statistical model for the study. (Contains 51 references.) (KB)

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Competent Children at 10

Familes, Early Education, and Schools

Cathy Wylie Jean Thompson Cathy Lythe

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COMPETENT CHILDREN AT 10

FAMILIES, EARLY EDUCATION, AND SCHOOLS

Cathy Wylie

Jean Thompson

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New Zealand Council for Educational Research
Te Rūnanga o Aotearoa mō te Rangahau i te Mātauranga
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EXECUTIVE SUMMARY

This is the fourth report from the Competent Children project, which is following a sample of Wellington region children as they grow from young children who attended an early childhood education centre, through their school attendance, and, we hope, their early adulthood. The main aim of the project is to chart the contributions to children's progress that are made by some of the main experiences and elements in their lives: family resources, early childhood education, school experiences, children's interests and activities in the home or outside school, and their relations with their peers. This report provides descriptive material about the children's progress and lives as they turned 10, and statistical analysis of the relationships between their progress and the elements and experiences of their lives.

Progress

The Competent Children project looks at ten different aspects of knowledge, skill, and dispositions, which are valued in contemporary New Zealand. We have called these competencies: hence the name of the project. Besides the essentials of literacy and mathematics, we include communication, perseverance, social skills with peers, social skills with adults, individual responsibility, logical problem-solving, curiosity, and fine motor skills.

At age 10, we found that reading, mathematics, communication, perseverance, and individual responsibility were the competencies which were most closely related to each other. But each competency measure in the study taps different aspects of children's performance.

Because the Competent Children project sample is based in the Wellington region, which has a higher proportion of high income families and higher parental education levels than New Zealand as a whole, the summary of children's progress given next is likely to give a picture of higher performance than one would find nationwide.

Most of the study children at age 10 were comfortable in the school environment. They followed class routines without having to be reminded, they took responsibility for their own things, they completed work, listened to teachers, and showed them respect. Most could follow conversations and stay on topic, pass on messages accurately, and usually understood the stories and instructions they heard from their teacher. They continued to enjoy new experiences or challenges, to take an active interest in their surroundings, and to concentrate if working on something that interested them. Three-quarters of the children now finished all their work always, or most of the time, up from 65 percent at age 8. Around 10–15 percent of the children showed signs of unease in the school environment or with their peers; they scored 2 or less on the 5 scale teacher ratings we used.

Just over half the children never lost their temper with their peers, and were always included in games. Most children were good at making and keeping friendships, and were unlikely to be led astray by peer pressure. However, though most children were working independently, they continued to need adult intervention: only 18 percent could always work with other children over an extended period of time without it (up from 12 percent at age 8). There were signs of growing confidence in solving issues with other children, but also signs that aggressive responses were hardening for a small group of children.

Reading had progressed: the PAT Reading Comprehension median raw score at age 10 was 141 percent of the age 8 median raw score, and the Burt Word Reading test, 149 percent. writing scores had also increased, with slightly higher scores for the surface features of writing than the deep features. No direct comparison can be made of the mathematics tests used, since different items were used each time. Scores on the Standard Progressive Matrices had also increased, with age 10 scores 131 percent of age 8 scores. Most children had high scores on the fine motor skills, as they also had at age 8, so there was little change on the fine motor skills measures for most children; but 9 of the 10 children with very low scores at age 8 had improved over the two years.

Different Patterns of Progress

Children's performance on most of our competency measures at age 10 could not be accurately predicted from their performance at near age 5, indicating that school and other experiences have important roles in children's ongoing development, and their transition from dependence to independence. Children also respond to specific environments, and interactions with different teachers and adults, particularly in their development of dispositions and social skills.

This was less true of their mathematics and reading scores, however, indicating that children's initial progress in these core aspects of school and adult life draws substantially on their knowledge and experiences prior to schooling. Overall, age 8 scores provided a more reasonable guide to children's performance at age 10, and underlined the importance of the first few years of school as providing the vital platform for patterns of future learning. Consistent with this is the fact that there was little change between ages 8 and 10 in the proportion of children still having difficulty in reading, mathematics, story writing, spelling, and handwriting.

If we are to make a difference for children who have less access to and less experience of print and the use of mathematics in everyday life, then we will need to focus particularly, as the current literacy and mathematics initiatives do, on these first few years of school.

Children who started school with high scores generally maintained those scores. Children who started school with low scores were much more likely to improve their scores if their parents were highly educated or if their family had a high income, and thus greater access to other resources.

What makes a difference?

Many of the main factors reported below make their own separate contribution to children's performance, irrespective of family income and parental education levels. They work as well for the child from a low income home, whose parents have low educational levels, as they do for a child from a high income home, whose parents have high educational qualifications.

Early Childhood Education

Early childhood education continued to play a part in children's performance, five years after they had moved on to school. This is a powerful legacy. The aspects of early childhood education which were particularly important, and which emerged in our analysis of key factors accounting for differences in children's performance at age 10, were related to the quality of interaction between early childhood education teachers and the children. Children's scores were higher if their final early childhood education centre had:

- staff who were responsive to individual children
- staff who asked open-ended questions of children
- staff who joined children's play
- staff who allowed children time to complete activities
- staff who guided children in the centre activities
- a variety of activities in different learning areas which children could choose
- experiences of co-operative and supportive work with their peers
- lots of printed material evident and used.

The ECE centres which provided these key aspects of early childhood education quality were more likely to be those serving children from middle income families. Indeed, probably because of this difference in quality, the socio-economic mix of a child's final early childhood education centre was found in our multifactor models of the key factors related to children's performance at age 10. Another reason why the ECE socio-economic mix may matter is because it signals differences in the cultural capital available through children's peers in their early childhood education play.

Our findings here point to the need to ensure that initial teacher education and professional development encourages early childhood education staff to understand and to provide these key aspects of quality, and that early childhood education funding formulae ensure that these are as available to children from low income homes as those from middle and high income homes. [1] Indirectly, it also points to the need for staff:child ratios and group sizes that enable early childhood education teachers to get to know individual children well enough to incorporate their interests, as well as enlarge them.

School Experiences

School and Class Characteristics

Family income played a part in the kinds of school children attended, particularly in relation to its socio-economic decile rating (its socio-economic mix), and its ownership. However, on the whole this different pattern of access did not matter for the children's competency levels, with several important exceptions. Children who attended decile 1–2 schools did score lower than others for the literacy measures and mathematics—but we also found that children from decile 3–4 schools scored as well as those from decile 9–10 schools. Children from decile 1–2 schools were less likely to report home activities and interests that would complement their work at school.

Child and parental experience and satisfaction with schools was much the same across school socio-economic deciles, and for different forms of ownership (whether the school was state, state-integrated, or private). Children who attended private schools did score higher on the reading measures, which may indicate the greater emphasis on initial reading mastery in private schools, or a greater emphasis in the children's homes on experiences which support reading.

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[1] Increased equity funding has been announced for early childhood education, and a long term strategic plan for the sector is currently being finalised. The Competent Children project data on early childhood education quality and access for different social groups would provide a very valuable base-line to monitor the impact of these policy changes, as well as policy changes over the last 8 years.

Most of the study children could expect to be with the same classmates for the year. Sixty-two percent of the students were in classes that had a turnover rate of less than 5 percent. However, 11 percent of the children in decile 1–2 schools were in classes with a turnover of 21 percent or more. Children whose classrooms had a student turnover rate of more than 5 percent had lower scores for mathematics, though this did not affect children whose mothers had a tertiary or university qualification.

Two-thirds of the teachers thought the overall level of parental support in their classroom for children's school work was very good or higher. Being in a class where parental support was rated highly by the teacher was associated with higher scores for children for three of the four literacy measures and for Logical Problem-Solving.

Teacher Perspectives

Thirty-one percent of the children were seen by their teachers as having a very good or excellent overall achievement level, 29 percent were very good in some aspects of the curriculum, and average in others, 27 percent were average, and 13 percent were making slow progress. These overall assessments matched the children's scores on our competency measures pretty well.

Teachers' overall assessments were also linked to their views of the children's classroom behaviour. The higher the level of achievement, the higher the proportion of children seen to be mature, sensible, and providing leadership. Conversely, the lower the level of achievement, the higher the proportion of children seen to have poor self-esteem, to be immature or easily led astray, impatient, and living in their own world. They were more likely to be involved in bullying. Few of the very good/excellent achievers were seen to have poor work habits. But they could be as passive, self-centred, or bossy as other children.

Children who were identified as slow achievers were generally struggling with most aspects of the curriculum, other than music, art, drama, and physical education. The very good/excellent achievers were more likely than others to have strengths in writing to convey information, science, social studies, problem-solving, spelling, and handwriting.

Problem-Solving and information technology were identified as areas of curriculum strength for the first time in children's school lives. Only two curriculum areas show steady increases between ages 6 and 10 in the proportion of children showing strengths in them: physical education and science. Between age 8 and age 10, reading, social studies, and technology show increases in the proportion of children identified as showing strength in them. There was little change for the other curriculum areas, including mathematics and oral language.

The picture of children's classroom behaviour was much the same at age 10 as at age 8, which is consistent with the picture emerging from the study of the importance of the first few years of school in fixing useful knowledge, habits, and confidence. But fewer children were described as aggressive or unwilling to try things.

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Teachers' views of children's performance and behaviour were unrelated to the children's social characteristics other than gender; there were no differences related to ethnicity, family income, or family type.

Children's School Experiences

Seventy percent of the children were reported by their parents to be enthusiastic about school; 13 percent were described by their parents as being matter of fact and simply accepting school attendance as part of their daily routine; and 9 percent had mixed feelings, sometimes enthusiastic, sometimes not. Four percent of the children were unhappy with school, and another 3 percent had taken a while to settle but were now enjoying themselves. One percent were bored. Children who enjoyed reading and writing were more likely to feel enthusiastic about school, but enjoyment of numbers was not associated with positive feelings about school. Children from high income homes were more likely to be enthusiastic about school, but otherwise family characteristics made no difference.

Looking back to how children had taken to school initially, we found that children who took a while to settle or who were matter-of-fact about it—lukewarm—had lower scores at age 10 than children who had started their school careers with enthusiasm, or than those who were initially unhappy. Perhaps open unhappiness gives clear signals for additional adult intervention and support at the time when it is needed. Our findings also indicate the need for such intervention and support for children who take time to settle into school, and those who are only lukewarm in their reaction.

Most of the children gave positive ratings for their school experiences. The aspects of children's experience which were related most to children's competency levels were to do with fair treatment, having interesting work, and keeping out of trouble. Some boredom and bullying was experienced by most children; but it did not show associations with children's competency levels unless it was a constant feature of children's lives at school. Most of the children saw school as a place for work, friendship, and enjoyment, and they saw achievement reflecting their effort.

Most children thought that working hard and learning something interesting were good indicators of progress at school, as were gains in knowledge and understanding. They were ambivalent about the relevance of comparison with other children as a sign of their individual performance.

Thirty-two percent of the children said they had been picked on or bullied in the last few months, somewhat higher than the 20 percent reported by teachers, probably because teachers do not see everything that happens in playgrounds. Two-thirds of the children who had been bullied mentioned verbal abuse, and 38 percent, physical abuse. Responses to bullying were mainly divided between calling upon an adult for help, and doing nothing and trying to ignore the incident.

Almost half of those who bullied other children had been bullied themselves. We found that children who bullied tended to score lower on the competency measures than children who remained free from bullying, or who had been victims of bullying.

Children's Communication with their Parents About School

The majority, 79 percent, of the children felt their parents were interested in what they did at school. Some were unsure, or thought they were only interested sometimes. But only 1 percent felt their parents had no interest at all in their school life. Children who thought their parents were interested in school were more likely to talk to them about what happened at school.

Fifty-six percent of the children talked regularly to their parents about what they did at school, 36 percent sometimes, and only 7 percent said they never talked to their parents about school. But only a minority of children told their parents everything. Around half focused on schoolwork, and 30 percent on what happened in the playground. Ten percent told their parents only about the good things that happened to them.

Parental Satisfaction and Contact with their Child's School

Seventy-one percent of the parents were satisfied with their child's progress at school, 22 percent had mixed views, and 7 percent were dissatisfied. Parents' satisfaction with their child's progress at school was unrelated to family characteristics, school decile or ownership, change of school between the ages of 8 and 10, or the number of schools attended since the child was 5. It was also unrelated to teacher views of their relationship with the child's parents and parental involvement in the school.

Parental satisfaction with their child's school progress was related to children's reports of their school experience, and their enjoyment of reading, writing, and mathematics (other than measuring). Interestingly, half of the parents who were not satisfied with their child's progress had children whom their teachers identified as having a very good or excellent level of achievement, compared with 28 percent of the parents who were satisfied. This pattern differs from previous ages, where parents who were satisfied were more likely to have children whose achievement was rated highly by teachers.

Most parents, 89 percent, said that they were comfortable in talking to the child's teacher about their child. Only 2 percent were not, and another 7 percent were comfortable about some aspects, but not others.

Parents were less likely to work with their child's teacher to resolve problems encountered by their child at age 10 than at age 8: 50 percent, compared with 65 percent. At age 10, children's happiness and social well-being was less likely to be raised with teachers by parents (26 percent, compared with 38 percent at age 8 and 34 percent at age 6). Academic progress was a focus for 27 percent of the parents, slightly less than the 32 percent at age 8, but much the same as at age 6. Their child's health problems were a concern raised with teachers by 4 percent of parents.

Forty-eight percent of the teachers described their relations with the child's parents as excellent or very good, and 28 percent said that they had a good relationship. Twelve percent said that relations were satisfactory. Only 1 percent felt that they were on difficult terms with the child's parents. Ten percent had had no contact with the child's parents. The overall picture was much the same as at age 8.

Teachers' views of their relationship with children's parents showed some association with their ratings of children's social and attitudinal competencies, but less so with the children's Literacy and Mathematics scores on our tasks. Generally, children whose teachers felt they had a very good or excellent relationship with their parents scored highest, and those whose relationships were satisfactory or difficult, or where there was no relationship because the teacher had never met the parent, scored lowest. This is consistent with the view that positive relationships — and information sharing — between the adults who share responsibility for the child is beneficial for children's development.

Ninety-three percent of the parents had some involvement with their child's school. Half mentioned voluntary work, including contributions to fundraising. The proportion of those who helped in classrooms halved between ages 8 and 10, probably reflecting the increased full-time employment of mothers over this period, the feelings of 10-year-olds about having parents in their class, and the growing amount of independent work that children were now capable of. Almost half the parents talked regularly with their child's teacher—a considerable increase from the 11 percent at age 8.

Fifty-five percent of the parents had decided which secondary school they would like their child to attend, and 21 percent were weighing up a choice between several schools. Family characteristics played a role in this choice. Resources and student choice loom large for parents when they think of their child's long term educational achievement, whereas individual motivation and skills occupy teachers' minds. Family income and maternal qualification were reflected in teachers' views of children's future educational performance, in contrast to their views of their current performance; ethnicity, however, was not. Teachers do see boys facing more obstacles, arising from boys' own attitudes and approach to their education, in both the short and long term.

Fifty-three percent of parents wanted their child to have a tertiary education, and 40 percent were saving for their child's education after primary school. Parental aspirations for their child's education appear to reflect their child's school experience and progress over the first 5 years, since these aspirations for their child at age 5 were not related to their child's competency levels at age 10.

School Attendance and Mobility

Ninety-three percent of the children in the Competent Children project sample had very good attendance records. Children whose attendance was poor or satisfactory scored lower only for Perseverance and Individual Responsibility.

Sixty-eight percent of the study children were still in the same school they started in. Twenty-three percent were at their second school by age 10, and 7 percent were at their third school. Two percent had attended four or more schools by the time they had reached their fifth year of formal education. Children who had attended 4 or more schools by age 10 had lower scores for Curiosity, Communication, writing, and reading age.

Gender

Although there is currently a lot of popular and media interest in the comparative performance of boys and girls, the actual size of the gaps favouring girls is quite small in most reports of children's performance at this age.

Parents of boys had been less satisfied with their school progress when the children were aged 8, but at age 10, they were just as satisfied as the parents of girls. Perhaps this reflects different expectations and tolerances of boys and girls. Teachers did see boys struggling more with work habits, social skills, and maturity. Parents of boys were more likely to say that they had worked together with their child's teacher on problems encountered by their child (57 percent, compared with 43 percent of girls' parents). Boys' parents were also more likely to discuss academic progress (34 percent, compared with 19 percent of girls' parents). Discussion of social-emotional problems was similar for both boys and girls.

Gender did not emerge in our multifactor analyses identifying key factors related to mathematics, reading comprehension, and Communication, but it did in relation to perseverance and individual responsibility. Girls were more likely to undertake the kinds of interests and activities, including not only reading, but its *enjoyment*, which were associated with higher scores in mathematics and literacy, and which one could see setting them in useful habits. Boys were less likely than girls to enjoy school, or to feel it offered them interesting things to do—but they were also more likely to feel they did not do lots of good things with their family.

We had found that boys were more variable than girls in their progress between ages 5 and 8. However, at age 10, we found some volatility among girls who had been high scorers at age 8 for the social and attitudinal competencies, and for writing.

English as a First Language

Having English as a first language does make it easier for children to progress through New Zealand's largely monolingual mainstream education system. Those who did not have English as their first language were scoring much lower for mathematics, and lower for the literacy and communication measures particularly. Further work would be needed on whether these differences reflect language or knowledge barriers (or both), and would need a larger sample of children from different cultures than we have in the Competent Children project.

Family Resources and Characteristics

Our main findings in this area are that family income and parental education largely underpin or account for any differences related to family type, family stability, welfare receipt, and ethnicity.

Family Type and Stability

At the age of ten, 73 percent of the study children remained in their original two-parent families. Eighteen percent who had originally had two parents lived in one-parent families. Seven percent of the children lived in two-parent families where one of the parents was not the biological parent. Two percent of the children remained in their original one-parent families. One percent were cared for by their grandparents, another relative, or someone else.

Children in original one- and two- parent families experienced less change in their lives between ages 8 and 10, and two-parent families had higher average incomes than others. However, family type and changes in family type were not linked to children's competency levels.

Sixty-one percent of the children who had a parent no longer living at home continued to have regular contact with their non-resident parent. Seventeen percent of these children rarely saw, or had only irregular contact with, their non-resident parent (all fathers). Twenty-two percent no longer saw their parent: 13 percent had lost touch and 9 percent had a deceased parent.

Seventy-one percent of those who saw their non-resident parent were said by the resident parent to get on well with them. However, 21 percent had an up-and-down relationship with their non-resident parent. At age 8 none of the children with a non-resident parent were said to have a poor relationship with them, compared with 6 percent at age 10.

Non-resident fathers appeared to maintain relationships with their children's schools: teachers were just as likely to see them as the fathers of children in intact two-parent families.

Sixty-five percent of the study children had moved house at least once since they were born. Twenty-seven percent of the children had moved house once, 12 percent twice, 16 percent three or four times, and 10 percent had experienced 5 or more moves. Children from middle and high income homes were more likely to have stayed in one place or moved only once (64 percent, compared with 50 percent of children from low income homes). The most mobile were the children in re-formed two-parent families, with only 14 percent of this group still in the same home as they were born in, or experiencing only one move. But moving house was not associated with any differences in children's competency levels.

Indeed, change in the children's lives did not affect their scores. Nor did being upset. Only the children who were not coping at all with something which was upsetting them showed lower scores, and that difference was no longer evident when we took maternal qualification into account. Thirty-four percent of the parents identified something which was upsetting their child (compared to 44 percent at near age 5, when some children were somewhat apprehensive of starting school). A third of the children who were upset by something were said to be coping well with it, 54 percent varied in their reaction, and only 13 percent of the children who were upset were not coping.

These findings are consistent with other longitudinal studies. Change and events which are not always pleasant are part of life. Children need support during times of transition and change, and when they are upset. It appears as if most of the children in our study received this support.

There is a difference between a time of transition and what results from it. Parental separations and family changes are rarely easy. Yet there appears to be no long term disadvantage for the performance of the children in the Competent Children project from changes in family type. The sole-parent families in this study are not isolated, and meaningful contact with non-resident parents is maintained for most children. We are seeing some new dynamics in family life.

Income Source

Wages or salary were the main sources of income for 56 percent of the study families. For 8 percent, the main income source was self-employment, and for 11 percent, income came from both wages and self-employment. Seventeen percent of the children's families received welfare as their main income source. Forty-five percent of all families receiving a state benefit supplemented their benefit with income from wages.

Welfare benefits were significant sources of income for one-parent families. Maternal qualifications had some bearing on benefit receipt. Thirty-eight percent of the families whose mother had no qualification were currently receiving a benefit, falling to 21 percent of those with a university qualification. A further 17 percent of the families whose mother had no qualification had received a benefit in the last two years, compared with 7 percent of those with a university qualification.

Parental Employment

Before the study children started school, 19 percent of their mothers were in full-time paid employment, and 40 percent were in part-time or casual paid employment. At age 10, 32 percent of the children's mothers were in full-time jobs, 46 percent were in part-time work (38 percent in part-time jobs, and 8 percent in casual employment), and only 22 percent were not in paid employment.

Just over half of the mothers who were not in paid employment would like paid work, and another 7 percent would like temporary work. Chief among the barriers to paid employment were availability of work with flexible hours and decent pay rates, availability and affordability of childcare or after school care, the need to care for younger children, and job training. Poor parental health was also an impediment. In our sample, maternal qualification levels had no bearing on whether mothers were in paid employment, or whether they were working full-time or part-time.

The average number of hours per week worked for pay by the employed mothers of the study children was 29. Mothers working part-time worked 19.09 hours a week on average, up from 15.23 hours at age 8. Mothers working full-time worked 42.14 hours a week on average, up from 40.87 hours at age 8.

A third of the women who were employed said that their job involved irregular hours, weekend work, shift work, long hours, or travel, and 7 percent held more than one job. Mothers working full-time were more likely to have a job which involved long hours, travel, or weekend work (54 percent, compared with 38 percent of mothers in part-time employment).

Ninety-four percent of the children's resident fathers were in paid employment, all but 2 percent working full-time. Six percent were unemployed. The average number of hours per week worked by the employed fathers of the study children was 48. Nearly two-thirds (65 percent) of the men worked irregular hours, at weekends, had long hours, did shift work, or travelled in their paid employment. Three percent held two jobs.

There were no associations between current maternal employment and children's competency levels. Paternal occupational status shows some differences in scores between children whose fathers had professional work, and those who were in unskilled work. Some differences were also apparent in looking at previous parental occupational status and children's competency levels at age 10.

Only 4 percent of the children said no one was home when they got home from school. Parents were largely self-reliant in looking after children before and after school, during school holidays, or when the children were sick. Thirty-one percent could call on grandparents or other relatives, and 8 percent each on a friend or a paid caregiver.

If parents needed other kinds of help, they were more likely to call on their friends than on members of their extended family or their neighbours. Eighty-one percent of parents said that they could easily call on their friends if they needed help, compared with 63 percent who could turn to other family members, and 59 percent who had neighbours readily available to lend a hand.

Ethnicity

Most of the differences initially apparent between children from different ethnic backgrounds in our study were no longer evident when we included maternal qualification or family income in our analysis. In other words, these differences are likely to reflect socio-economic differences between ethnic groups. But it is of concern that Maori and Pacific children had much lower scores than others for mathematics, after allowing for differences in family income and maternal qualification levels. While most of their lower literacy scores could be accounted for by these socio-economic differences, Pacific children were still scoring lower than Pakeha/European children for reading comprehension, and Maori children were doing so for reading age.

Teacher views of children's strengths and weaknesses show no differences related to ethnicity, nor do children's reports of their school experiences. There were few ethnic differences apparent in the material we gathered on children's out-of-school activities, though Maori children and parents in the study were less likely to mention reading as one of their main activities.

It therefore seems likely that the ethnic differences in performance found for our sample may be located in children's knowledge base prior to coming to school, rather than in teacher attitudes, or lack of engagement or enjoyment of school activities. Maori and Pacific children do have lower early childhood education attendance rates than others, and early childhood education attendance appears to be particularly useful for mathematics development.

Family Income

The associations between family income and children's competencies are not linear. Children whose family income was low (below $30,000) when they were five or younger continue to score lower than others on some competencies at age 10, regardless of whether their family income had or had not improved. This persistence of disadvantage for children from families with a low income when the children were young points to the importance of social policy and public provision which support such families, reduce the incidence of low income families, and provide essential health and education free, or at least at an affordable cost. At the other end of the scale, children who spent their early formative years in families with incomes of more than $60,000 continued to show higher scores for all the competencies at age 10. But the converse is not true: children from low income families at age 5 have lower average scores at age 10 only for mathematics, PAT Reading Comprehension, and writing. Unfortunately, these are key areas both for school work and for later employment.

Our analysis of why low income children are disadvantaged in these areas suggests that it is not because of their attitudes or social skills: their average scores on our measures for these (including perseverance, individual responsibility, and communication) are no different from those of children in middle income families. The Competent Children project data do not support theories about cultures of poverty or welfare dependence. Low income levels seem to make a negative difference for children because low income families have lower levels of parental education (measured in the Competent Children project by maternal qualifications), and fewer experiences and resources of the kind which use and extend language and mathematics use.

Parental Education Levels and Children's Experiences

We analysed parental qualification levels using maternal qualifications only. We would expect to find similar patterns for paternal qualifications.

Maternal education levels have more bearing on children's competency levels than family income levels, particularly for Mathematics and the PAT Reading Comprehension test. The performance of children whose mothers have no qualification is noticeably below others by age 10; conversely, the performance of children whose mothers have a university qualification is noticeably higher than others. But there are no clear linear patterns in between these two ends of the qualification spectrum.

In addition, parental education levels play an important part in patterns of progress from age 5. Children who were low achieving earlier in school were more likely to improve their scores above the median by age 10 if their mother had a tertiary qualification. It was more difficult for a child whose initial scores were high to maintain that progress if their parent had limited educational success. However, if they were able to sustain that progress to age 8, then the foundations appeared to be in place to keep maintaining it.

This underlines the importance of ensuring that children leave school with some qualifications, both for their own use and enjoyment, and for the benefit of their future children. Education clearly has benefits which go beyond the individual, and beyond the utilitarian value of ensuring access to reasonable employment. It plays an important role in the way knowledge and skills become part of the everyday, the habitual, including family conversations and use of leisure. With limited education, there is more use of the passive medium of television, less use of the printed word, and less engagement with clubs, groups, music or other performing arts. Television can soak up time for these other pursuits, and it had negative associations with children's competency levels.

Thus children whose parents were not provided with solid educational ground themselves seem to draw on a narrower range of experiences at home, both before and during their school experiences. While they find school activities more interesting than other children do, and they trust their teachers, they also find the *work* of school more challenging, less related to what they have experienced before school, or outside school.

The Role of Children's Interests and Activities

Most children in the study felt that home offered them interesting activities, and that their family supported them, and treated them fairly. Many children got bored sometimes, or told off. Most said they never felt lonely.

Being treated fairly had positive associations with children's competency levels, as did getting help when the child needed it. Always having to help at home had negative associations. Perhaps surprisingly, being listened to at home and being asked about school were the items which were least associated with children's competency levels. It was clear that children could flourish without unstinting attention, or having every minute of their day filled.

By age 10, 77 percent of the children were said by their parents to be using a dictionary at home, and 70 percent an encyclopaedia. A third of the children were reading teenage magazines, and 27 percent teenage books. The kind of reading which was associated with higher scores in the competencies was fiction, instructional material, and encyclopaedia use.

Sixty-nine percent of the children were reported by their parents to enjoy reading; 14 percent enjoyed it sometimes, and 17 percent did not – a marked jump from the 9 percent who did not enjoy reading at age 8. Children were more likely to enjoy reading if they watched less than two hours of television a day. Enjoyment of reading was associated with higher scores for most of the competencies.

Eighty-three percent of the children said they used a library. Children who used a public library every 3 weeks had higher scores than others.

More children were writing factual reports at home at age 10, probably related to their homework, and more were keeping a diary. Imaginative writing, such as stories, poems or plays, stayed at much the same level as at age 8. Children who wrote at home tended to have higher scores overall, particularly if their writing included reports, plays, poems, or word-puzzles.

Fifty-four percent of the children enjoyed writing generally, and 20 percent were said to enjoy some writing activities. Twenty-six percent of the children did not enjoy writing at all, slightly up on 19 percent at age 8. Boys were only half as likely to enjoy writing as girls were. Forty-seven percent of the children enjoyed both reading and writing, and 11 percent enjoyed neither.

Enjoyment of writing was associated with higher literacy scores, and scores for the social and attitudinal competencies in the study. It was unrelated to Mathematics, Logical Problem-Solving, and Curiosity scores.

By age 10, more than 90 percent of the study children could add money correctly, use a calculator for simple addition or subtraction, and tell the time. Almost double the proportion at age 8 could do the times-tables up to 10, and use a calculator for simple multiplication or division. The mathematics activities at home which were most associated with higher scores for children were adding money, working out fractions, and knowing times-tables. Measuring, weighing, and using a calculator were also associated with higher scores, particularly with mathematics. Playing card and board games had been positively associated with children's competency scores at earlier ages, but no longer made a difference at age 10.

Most of the mathematics and literacy activities which made a positive difference for children's scores were ones that many had been doing by age 8. Our findings therefore point to the importance of cumulative experience, and undertaking these activities earlier rather than later. It is the children who have not become accustomed by age 10 to using mathematics in their everyday life outside school who lag behind others.

Sixty-eight percent of the children enjoyed using numbers, and 65 percent liked using patterns, but only 48 percent liked measuring things. Enjoyment of numbers and patterns was associated with higher scores for all the competencies other than the literacy ones; but the enjoyment of measuring was associated with higher scores for Mathematics and Curiosity only.

All the children in the study had homework to do, most regularly. Teachers reported that 72 percent of the study children always did their homework, 21 percent did it sometimes, but not always, and 7 percent did no homework. Children who always completed their homework tended to score higher overall than others. Parents were more likely to see value in homework which extended children's understanding, such as project work or mathematical problems, and spelling. Children were most likely to enjoy mathematics, art, or 'creative' homework.

Leisure Activities

Children's main activities outside school remain watching television, physical play, and playing with other children. Twenty-one percent of the children mentioned video games, up from 4 percent at age 8. Eighty-four percent of the children at age 10 had joined a club or were taking part in some form of organised activity outside school. Fifty-one percent of the children had lessons or coaching outside school, mostly in the sports and performing arts, and 51 percent also played a musical instrument, or sang in a choir. Children who took part in performing arts, or music, tended to have higher scores overall; sports involvement was positively associated with scores in Mathematics and Logical Problem-Solving.

By age 10, the Competent Children project children were watching an average of 2.2 hours television a day, somewhat more than at ages 6 and 8. Previous television watching has almost as much bearing on children's competency scores as their current watching. Children who watched more than two hours a day on average at ages 5 and 6 tended to have lower Mathematics and Literacy scores than others, and there are similar patterns for ages 8 and 10. Television takes time that could be spent more profitably, providing less of the kind of stimulus for or uses of language and symbols which other activities make available to children.

Children's television watching amount reflects the amount of television their parents watch. A large amount of daily television watching by parents was also associated with lower children's scores.

Eighty percent of the study families had a computer at age 10, compared with 71 percent at age 8, and 57 percent at age 6. Only 10 percent of the children whose family had a computer made no use of it. The two main uses children made of computers were to play games (87 percent of those whose families had computers), and wordprocess (45 percent). Other main uses included accessing information from CD Roms, graphic software, and the internet. Both current and previous family computer ownership were associated with higher scores for children. Word processing, the use of graphics, and the use of CD Roms were the particular activities which seemed to make a positive difference; playing games did not.

What is Key?

There is no single recipe that will guarantee that every child will be competent in all aspects of their life. Our analysis does show some underlying principles or threads which can run through quite different specific experiences and interests to provide children with solid knowledge and confidence, yet also challenge them to keep going further. It also points to things that make that development more difficult.

If children are disengaged, at either home or school, then they find it harder to make progress. If they find school to be mainly a place to get into trouble and focus on relations of power, through involvement in bullying, it is harder for them to develop the strengths of absorption and focus in tasks which help development. If children's attention and time is taken up with activities and interactions which have little cognitive content, which do not raise questions, pose problems to be solved, and put school knowledge to work to provide practical solutions, then they are unlikely to develop the habits that go with learning and prowess. Television watching needs to come with a 'health warning'; and children should not be expected always to help out at home, if that help consumes most of their spare time, and is largely repetitive.

We found that while children who came from low income homes, and homes where parents had not enjoyed some educational success themselves, faced greater hurdles, activities and interactions which fed children's use and enjoyment of literacy, mathematics, patterns, symbols and the like often enabled them to go over those hurdles. There appear to be four strands to ensuring supportive interactions between children and the adults who are responsible for their development—parents and teachers—at early childhood education and at school:

- adults are responsive to children—they know them as individuals, so they can feed and build on their interests and reactions, and respect them as individuals
- adults are warm
- adults are fair
- adults include some cognitive content in their interactions with children.

Children do not need all their hours filled—to be constantly interacting with others, or involved in activity. They need to have space for free play, unobligated time. What matters is not so much the quantity of their activities and interactions as the quality of them.

OUTLINE OF THE COMPETENT CHILDREN PROJECT

Figure 1
Competent Children Project Outline

Year	Main Study	Survey	Schema Study
1992	Pilot Study		
1993–94	PHASE I **Fieldwork**—near 5-year-olds 307 children and parents 87 ECSs 6 Instruments **Reports:** Competency, quality frequencies reported to Ministry of Education & study participants (seminars and posted summary) **Pilot study**–6-year olds 16 children 10 schools	**Fieldwork**—near 5-year-olds 767 children 56 ECSs 2 instruments (parent, ECS) Initial ECS usage, school choice, and tertiary saving reported to Ministry of Education	**Fieldwork**—near 5-year-olds 18 children (in main study also) 4 ECSs 6 instruments (as in main study and samples and records (child parent, ECS)
1995–96	PHASE II **Fieldwork**–6-year-olds 298 children 121 schools 3 instruments	Brief postal contract with parent/caregivers. Consents renewed	**Book:** Thinking Children
1996	**Report:** *Competent Children at 5* **Handbook** for parents and practitioners: *Five Years Old and Competent.*		
1996–97	PHASE III **Fieldwork**–8-year-olds 523 children 168 schools 3 instruments	⇦ 242 children incorporated into main study *Report: Spreading Their Wings*	
1998	**Reports:** *Competent Children at 6* **Handbook:** *Six Years Old and Competent*		
1998–99	PHASE IV **Fieldwork**–10-year-olds 507 children 185 schools 3 instruments		
1999	**Report:** *Competent Children at 8* **Handbook:** *Eight Years Old and Competent*		
2000–1	Phase V Fieldwork–12-year-olds		
2001	**Paper:** Competent Children: findings and issues from the first 7 years. At www.nzcer.org.nz **Report:** *Competent Children at 10* **Handbook:** *Ten Years Old and Competent*		
2002	**Report:** *Competent Children at 12* **Handbook:** *Twelve Years Old and Competent*		
If funding continues:			
2002–3	Phase VI Fieldwork–14-year-olds		
2004–5	Phase VII Fieldwork–16-year-olds		
2006–7	Phase VIII Fieldwork–18-year-olds		

1 INTRODUCTION

The Competent Children project[2] is a longitudinal study of a sample of Wellington region children, which focuses on the contributions which early childhood education, school resources, family resources, and children's activities make to the development of New Zealand children's competencies.

We hope to enlarge our understanding of children's progress and the factors which affect it, and to provide knowledge and insight which can be used by parents, teachers, and policymakers in order to make a difference for our children.

In this study, we use the word competency to refer to aspects of knowledge, skill, attitude, and disposition which can be seen at work in everyday practice, or gauged through specific tasks. We explore 10 realms of competency in this study. They are:

> Communication, Curiosity, Perseverance, Social Skills with Peers, Social Skills with Adults, Individual Responsibility (Teacher-rated)
>
> Literacy, Mathematics, Logical Problem-Solving, Motor Skills (Children's tasks)

This set of competencies by no means exhausts the spectrum of capabilities which are valued in New Zealand. It does provide a reasonably comprehensive grasp of competencies which have been linked with successful learning (in a society which is putting more emphasis than previously on the role of education and learning in employment), and with satisfying social and economic participation.

Having such a range of competencies also allows us to see how usual it is for one individual to be competent in all of them, and, as we follow the study children over the years, to see whether patterns of achievement and prowess over time are different for different competencies, and related to different family, educational, interest, and peer factors at different periods of the children's lives.

This report describes what we found when the children in the Competent Children project were aged 10. It is the fourth report in the study, which has gathered material about the children from their parents and teachers, and from the children, when they were near age 5, when they were 6, after their first year at school, and when they were 8.

The team is currently gathering material as the children turn 12, and are starting to feel that they are no longer 'children'.

The progress of the study is outlined in the chart on the opposite page. Our original sample was 307 children, but we also collected data from parents on another 767 children, 242 of whom joined the full study at age 8.[3] At age 8, our sample was 523, and at age 10, it was 505.

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[2] The project has been funded by the Ministry of Education, and NZCER.
Figure 1 opposite sets out the work undertaken so far, and the resulting reports.

[3] The selection from this larger group was weighted towards low income/non Pakeha families, to ensure we would continue to be able to explore the contribution of differences in income and ethnicity over time. The distributions of the competencies of the group added at age 8 could not be seen as different from those of children in the original sample, allowing us to incorporate them into a single sample for analysis.

Six percent of the Competent Children sample now live outside the Wellington region: 11 of these 32 children have shifted to Auckland, 6 to the Manawatu/Wanganui region, 5 each to the Bay of Plenty and Canterbury, and one each to the Nelson, Northland, Southland, Taranaki, and Waikato regions.

At age 10, 274 of the original 307 children remained, an attrition rate of 11 percent. Around half of those who have left the study have shifted overseas. The family characteristics of those who are no longer in the study vary, with no clear over-representation of low income families.

The structure of this report is somewhat different from previous reports. We start in Chapter 2 with an outline of our analysis, the reasons for our emphasis on using particular kinds of statistical analysis to provide useful understanding, and what statistical analysis can and cannot show. This chapter contains technical details which will be more important to some readers than others. However, we would like to hope that readers who are not familiar with statistics can gain some insights from it also.

We then move to a description in Chapter 3 of the measures we used to assess the children's competencies, and their performance on those measures. Chapter 4 provides an analysis of the patterns of change in children's performance over time.

The next section explores the relationships between the children's competency levels at age 10, and the diverse range of factors, such as family income, which we have included in the study. Chapters 5 to 13 present a description of each of the factors we are exploring, for example, children's home Mathematics use, followed by the analysis of the relationship between that factor and our competency measures. In previous reports, we kept the descriptive and analytical sections separate. We hope by combining them here that the presentation will be more straightforward, and it will be easier for our readers to get a full picture of a particular factor.

Chapter 14 provides analyses of the main factors contributing to children's competency performance at age 10. The conclusion looks at the overall picture which our different analyses have built up of children's progress, from near age 5, when the children in our study were attending early childhood education, to age 10, when they are already approaching the end of primary school.

2 THE ANALYSIS – A TECHNICAL OUTLINE

The Competent Children project collects a wealth of data. We use this data to provide descriptions of the children's lives at different points, and to trace the changes in their activities, experiences, and competencies over time. We also use the data to explore the relationships between the children's competencies and a wide range of factors, including family resources, early childhood education experiences, the characteristics of the schools they attend, their own impressions of home and school life, their out of school activities, and their parents' satisfaction with their progress and future hopes for them. We use both current and past data in this analysis. Our main aim in the statistical analysis we undertake is to provide as rich a picture as is possible with quantitative data of the relationship between the various factors and children's competencies, or capability.[4] The rest of this chapter describes some of the main technical aspects of our approach.

Our statistical analysis of the relationship between children's competencies and the factors of their lives starts with one-factor models. We have modelled each of the competency measures separately, as well as constructing several composite scores which were used to consider outcomes in a more general way. In statistical analysis, a factor is a descriptive set of mutually exclusive categories of some attribute or description of a situation (for example, family income is a factor, and 'low' 'medium' and 'high' different categories, or 'levels' related to income). When we model a factor we compute the size of the variability we observe between the levels or categories, and compare that with the variability the data show beyond such classifications. This latter quantity we call the "background variability". When the variability between the strata is considerably higher than the "background variability", we have some evidence that the factor could be having an impact on the outcome.

The degree to which we can make the deduction that there could be an association is given by the probability, "p", of the F-statistic derived in an analysis of variance ('ANOVA'). Across our analysis, we have chosen to call situations with $p<0.01$ 'significant'. By this we mean that we think such a situation is rather unlikely to have arisen by chance alone; and for this level, we are saying that the chance is less than one in a hundred. We have called associations 'indicative' when p is <0.05 and >0.01 (and even sometimes slightly higher than 0.05). We have chosen this terminology to alert the reader to situations where there could be something going on, but we suggest more evidence is needed to feel more comfortable with the apparent association. In cases such as these we would expect stronger results with a larger sample.

Once we have established the likelihood of an association between our outcome variable of interest and the factor we have modelled, the next step in the analysis process is to do an analysis of contrasts. Because we usually had quite large contrasts, largish sub-sample sizes and approximately normally-distributed residuals, a technique of comparing means using a t-test was sufficient. The results of this analysis are to give the observed sizes of various differences between strata and also to estimate the probabilities that such differences could have arisen by chance had the true effects (as distinct from the sampled effects) of the strata being compared been the same and thus the true differences zero. These analyses of contrasts are not given in detail for every one-factor model – this report would be twice the size if we did that – but they are reported in the text where they modify the apparent differences evident in the one-factor model tables.

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[4] There are a wide range of statistical techniques available now for analysing data, and there is no single method which suits every study. The choice of which method is chosen depends on the nature of the data, and the purpose of a particular study. Appendix 1 outlines some of the reasons for the statistical methods used in this report.

The analyses of contrasts, not the significance of the factor in the ANOVA, provide the major results of the modelling process. Statistical significance can almost always be achieved by having a large enough sample to work with, but the actual size of difference which is likely to be associated with differing levels of a factor tells us the *extent* to which some factor could be having an impact. In practical terms we are not greatly interested in differences of less than about 2 percentage points, even though they may be statistically significant.

We also calculate the proportion of variance in children's scores for a particular competency which a given factor can account for, in statistical terms. There are several ways to think about the meaning of the proportion of variance. In the one-factor models, it provides comparative information about the weight of a given factor in relation to different competencies. For example, the socio-economic mix of a child's final early childhood education centre accounts for 13.9 percent of their Mathematics[5] score, but only 4.6 percent[6] of their Communication score. This tells us simply that the socio-economic mix of an child's final early childhood education centre appears to make a greater contribution to their Mathematics performance at age 10 than to their communication skills. Care must be taken when comparing results across different factors, however, as factors with more levels will in general account for more variance than those with fewer levels.

In the multi-factor modelling we do, what is of interest is the proportion of the variance in the range of children's scores which can be accounted for by a limited set of what are statistically identified as key factors. A model which accounts for around 20 percent of this variance is of limited use and validity; but a model which accounts for around 50 percent or more can be a useful guide to the main factors involved in the variation in children's scores. A model which can account for only half the variance in children's scores, however, indicates that other factors or measures of factors also have a role[7]. But accounting for only half the variance is realistic when what we are dealing with are social factors, standing for complex social and individual processes. It does mean that this model cannot provide tight predictions of children's future achievement, and that it should not be regarded as the final or only reliable description of the factors involved in children's performance. We will expand on this important point at the end of this chapter.

Before we undertake this multi-factor modelling, we add separately to the one-factor models two major factors which often overlap with others: maternal qualification and family income levels. This enables us to see whether a particular factor, such as television watching, makes a separate contribution to children's competency levels over and above maternal qualification or family income. This two-factor modelling also shows any interactions between the factors. Interactions refer to situations where the effect of a given factor differs across sub-groups. For example, one might find that children from low income families who have computers have higher scores on some competencies than their peers from low income families who do not have computers, but that having a computer at home makes no difference to the scores of children from high income families.

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[5] The competency measures used in the Competent Children project are given capitals in this report.

[6] 'Only' is perhaps a little harsh. Most one-factor analyses of the proportion of variance explained by individual educational factors show around 3–5 percent in overseas studies (e.g., Sundell, 2000).

[7] Nebycha, McEwan, & Older-Aguilar (2000) would argue for the inclusion of genetic factors to allow a full explanation of social variance. Dickens and Flynn (2001) suggest a more complex model of the relationship between genes and experience.

From the one-factor and two-factor models, we derive summary tables of the factors which are related to large differences in scores between sub-groups. These are useful in themselves, in terms of allowing overall patterns to be more easily seen. They also convey the messages that, on the one hand, there are no single factors which make all the difference in children's lives; on the other, a variety of factors can make a positive difference, and it is this variety or mutual reinforcement that matters as much as the individual factors.

We then use the factors which emerged in the one- and two-factor modelling as having the largest associations with competencies in two kinds of multi-factor analysis.

The first strand models the age 10 mean cognitive composite score (the average of the 3 scores on the Literacy, Mathematics, and Logical Problem-Solving measures) against the set of factors which had the largest associations with competencies, after allowing for the child's cognitive composite score at 5, 6, and 8. This analysis enables us to see the likely key contributors to children's competency levels in the period between the earlier competency score (ie at age 5, 6 or 8) and age 10. Some of these factors underpin others, particularly if the factors are closely linked; some are there substantially in their own right. This modelling is particularly useful in getting further insight into why maternal qualification and family income levels affect children.

The second strand of modelling which we have done at age 10 is to focus on activities and experiences which have a large to moderate association with key competencies, particularly Mathematics and the PAT Reading Comprehension test, but also Perseverance, Individual Responsibility and Communication. We have done this to explore factors which may be more readily amenable to policy, home, and school action than the social and economic conditions which shape income inequalities, and which shaped previous educational access and opportunities. These are the factors which can largely mitigate the influence of low family income or maternal education levels.

Patterns of Meaning

Statistical analysis allows us to uncover patterns which are not visible on the surface. Without it, we would not be able to compare the contributions of different aspects of children's resources and experiences to their competencies or capabilities. Statistical analysis also shows that some patterns are not all they appear to be, when we compare only raw scores. The analysis offered here allows us to see, for example, that while there may be raw score differences for children whose parents receive state benefits, compared with those whose parents receive wages, these differences are no longer evident when family income levels are taken into account. That is, it is most likely that it is the difference in family income levels that underlies what seemed to be a difference related to income source. A deeper understanding of what 'drives' or underpins the surface patterns in social life allows us the opportunity to address the underlying issues, rather than waste time, emotion, and money on surface differences.

But statistical analysis also has its limits, particularly in social research. It cannot explain everything, or provide absolute proof. Its results, like any others, do not explain themselves, but need interpretation in the light of other knowledge.

In statistical terms, human society and individual experiences are 'noisy' environments. An experiment in the hard sciences can limit the number of factors involved, and show that these factors between them explain a large proportion, even 90 percent or more, of the variance of the results. Statistical analyses of social data can usually account for a great deal less than this, unless there is a high level of association between a factor and the results (such as the inclusion of an earlier achievement score on the same test).

They are able to 'explain' less because there is simply more variability to explain.[8] Often the different factors are unable to be cleanly distinguished, since they cluster together in real life (e.g. parental education levels and reading levels). Finally, the factors themselves—or their measures—may be only proxies for the real drivers.

It is probably impossible to include all relevant factors in a statistical analysis of social data. Many factors are difficult to capture in simple, definitive measures, particularly the 'soft' kind related to interactions between people, or inner processes of making sense, which involve memory, emotion, and analysis. Yet these are important, and an understanding of them is essential.

But it is equally difficult to control factors, as can be done in the hard sciences through experimentation. Social experiments on human beings which allow the isolation of key factors and processes are often unethical. They are also impractical, since trying to find and retain samples which are exactly matched for a range of factors is near impossible, and, for a longitudinal study, prohibitively expensive.

Longitudinal research allows us to see whether earlier experiences and resources have a different bearing from current experiences and resources, and it seems reasonable to think of these earlier experiences as providing some explanation of current patterns. Even then, social research cannot provide the kind of proof of causality that the physical sciences can.[9] But for the very reasons cited above, such proof should not be required. Social research needs to be as systematic and thoughtful as the hard sciences, with whom it will share some methods, but the nature of what it studies is different in some essential respects.

Our aim in the Competent Children project is to harness the power of statistical analysis to provide illumination and understanding of children's development of the kinds of competencies which will allow them to learn well and do well as adolescents and adults, so that we can better support their progress.

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[8] This variability is a strong reason not to start analysis with models aimed at predicting scores for individuals in particular groups. Of more interest is to investigate the spread of scores and find factors which differentiate average scores for particular groups. Predictive models do not explain so much as provide a summary of the mathematical information which is available in the data. For example, statistical data is used for weather prediction, but it is not what is used to find out more about the physics of the atmosphere. One can investigate tides statistically and model their occurrence very accurately using just past tide information. But this predictive model provides virtually no information about what actually causes tides, which relates to the moon, the shape of the coast, the nature of water flow and so on. There is a fundamental difference between prediction and investigation.

[9] Nebycha et al (2000) also come, somewhat reluctantly, to this conclusion. However, they also retain hard science methods and ability to provide proof as their standard, and therefore find much of the research they review to provide only 'correlational' analysis. This is an interesting choice of term, since it assumes that social phenomena are what they are not: linear in nature, and linearly related.

3 THE CHILDREN'S COMPETENCIES AT 10

Individual Competency Levels

In this section, we look at the scores for each of the competencies in turn. The results show what could be expected of New Zealand 10-year-olds. However, it should be noted that our sample has more children from high income homes and fewer from very low income homes than the country as a whole. As we have found family income to be strongly related to children's competency levels, our sample's competency levels are likely to represent a higher level of performance than would be found nationwide.

Teacher-rated Competencies

Communication, Curiosity, Perseverance,
Social Skills with Adults, Social Skills with Peers, Individual Responsibility

The teachers had taught the individual children for an average of 7.4 months. The shortest period was 1 month (1 percent), and the longest 3 years (1 percent). The average age of the children when their teachers were interviewed was 10 years.

For these 6 competencies, teachers rated children by matching a set of statements related to each competency area to the child, using a 5 point scale, which we then converted to a numerical rating: always (5); often (4); sometimes (3); hardly ever (2); never (1).

The measures for these competencies remained the same as at age 8, with one item added to the measure for Social Skills with Peers.

We look first at scores on the individual items used to measure each competency.[10] Here we focus mainly on those items where more children scored at the top end of the scale, and those items where more children scored at the lowest end of the scale. For the children who have been in the study since age 5, we then compare their overall performance at age 10 with their earlier performance.

Finally we look at how well a child's score on an item matched their score on another item. If each child in the study had the same individual score on each of the 2 items being compared, that would give a correlation of 1 (written as $r=1$). This would be the strongest possible correlation. A correlation of below 0.3 means that there is practically no match in the scores on the 2 items being compared.

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[10] The scores of the original children in the study, and those who joined at age 8 from the survey, were compared and found to be very similar in their distributions for all the competencies. We therefore use the whole sample in our analyses except where otherwise stated.

Communication

Over three-quarters of the study children scored well for 4 of the 9 items in our measure of Communication. They could follow conversations and stay on the topic, they passed on messages accurately, usually understood the teacher's stories or instructions, and their speech was easily understood. On the whole, the children scored higher for receptive language (listening) than they did for expressive language. The lowest scoring items were for experimentation with language, and asking for clarification.

The overall median rating for Communication at age 10 was 72 percent. This is the same median for the study as at ages 6 and 8. At age 5, the median was 78 percent.

The range of correlations between the items making up the Communication measure was from r=0.29 to r=0.69, with a median of around r=0.45, a very similar pattern to earlier ages. Children's scores for passing on messages accurately and giving clear explanations had the highest correlations overall with other items in this measure. Sixty-five percent of the children got the same score for all of the 9 items—25 percent scored 5, 33 percent scored 4, and 7 percent scored 3 or less.

Table 1

Communication

Ranking → Item ↓	5 %	4 %	3 %	2 %	1 %
Receptive					
Can remember and carry out instructions after hearing them once	21	46	21	9	2
Asks for something not understood to be repeated or explained again	21	37	25	16	1
Follows conversation and stays on same topic	31	49	14	5	1
Usually understands stories or information read to class	40	46	11	4	0
Passes on messages accurately	42	39	13	5	1
Expressive					
Speech easily understood even by strangers	53	34	9	3	1
Varies speech to get ideas across	18	34	31	14	4
Experiments with language	6	31	38	20	4
Gives clear explanations or descriptions	21	41	29	8	1

Curiosity

Scores for the Curiosity items were generally lower than for our other measures. Around two-thirds of the children scored well (5 or 4) for the two items "enjoys new experiences/challenges" and "takes an active interest in his/her surroundings". These items were also the most correlated (r=0.57), particularly at the higher end of the scale.

The overall median score for Curiosity was 63 percent, the same median as at ages 6 and 8, compared with 69 percent at age 5.

Table 2

Curiosity

Ranking → Item ↓	5 %	4 %	3 %	2 %	1 %
Asks a lot of questions/wants to know how and why	13	36	32	18	1
Enjoys new experiences/challenges	18	45	29	8	1
Likes to put things together/take them apart*	10	30	34	16	5
Takes an active interest in surroundings	23	44	26	7	0

* Seven percent of the teachers felt they could not comment on this aspect of the child.

Perseverance

As at earlier ages, most children had a good concentration span when working on things of interest to them, and most also finished all their work (75 percent scoring 5 or 4 compared with 65 percent at age 8). Scores were lower for the two items which focused on persistence in the face of difficulty.

The median score for Perseverance was 75 percent, slightly higher than the 69 percent of the three earlier phases. Correlations between the items ranged from r=0.54 to r=0.62, a somewhat narrower band than at ages 6 and 8.

Table 3

Perseverance

Ranking → Item ↓	5 %	4 %	3 %	2 %	1 %
Finishes all work	34	41	17	7	1
Persists when encountering problem in doing something creative	17	39	31	10	3
Good concentration span when working on things of interest	40	37	17	6	1
Makes an effort even when unconfident	16	40	29	14	1

Social Skills with Adults

Almost all the children showed respect for their teachers. The median score here was 75 percent, the same as for the previous phases of the project, and the spread of scores and correlations between items was very similar to that at age 8.

The correlations between the items in our measure of Social Skills with Adults vary more than for the other teacher-rated measures, from r=0.24 to r=0.61. The item which was least correlated with others was showing respect for teachers. However, the highest correlations were between showing respect for teachers and being able to present the child's own point of view to teacher in an appropriate manner, and asking teachers for help or information when the child needed it, and interacting confidently with the adults in the school.

Table 4

Social Skills with Adults

Ranking → Item ↓	5 %	4 %	3 %	2 %	1 %
Confident interactions with adults in the school	24	42	24	9	1
Asks teachers for help or information when needs it	23	40	26	10	1
Shows respect for teachers	62	29	7	2	0
Can present own point of view to teacher in appropriate manner, even if disagreement	37	33	22	5	3

Social Skills with Peers

Just over half the children never lost their temper with their peers, and were always included in games. Most children were good at making and keeping friendships, and were unlikely to be led astray by peer pressure. More children at age 10 could always work with other children over an extended period of time without needing adult intervention (18 percent, compared with 12 percent at age 8).

Table 5

Social Skills with Peers

Ranking → Item ↓	5 %	4 %	3 %	2 %	1 %
Works with other children over extended period of time without needing adult intervention	18	49	21	11	2
Loses temper with other children ^{R}	54	30	13	3	0
Good at making and keeping friendships	25	47	20	7	2
Led astray by peer pressure ^{R}	27	37	27	8	1
Left out of games ^{R}	57	27	11	5	0

R= reverse scored, 5= never, 1= always

As with the measure of Social Skills with Adults, the range of correlations between the items rated by teachers in relation to children's Social Skills with Peers was also wide-ranging, from $r=0.12$ to $r=0.48$. Children's ability to make and keep friendships had little bearing on their susceptibility to peer pressure. Children who were left out of games—a sign of being unpopular (for whatever reason)—were also seen as less likely to make and keep friendships, but they were no more nor less susceptible to peer pressure than others.

In devising the overall measure of Social Skills with Peers, we gave equal weight to each of the 5 items rated by teachers, and to each of the 2 stages of the 2 social problem-solving tasks given to the children. These are described below.

The median score at age 10 was 69 percent, as at ages 5 and 8, and slightly higher than at age 6.

Scores for the social problem-solving tasks[11] showed very little match with teachers' ratings of the social skills used in working with other children in the classroom environment. The correlations were all below r=0.18.

Social Problem-Solving Tasks

The first task focused on getting a fair share of a scarce and valued resource. As at age 8, the children were asked what they would say or do if someone in their class had been using the class set of felt-tips for a long time, and they wanted to use them. They were then asked what they would do if their first action made no difference. The second task focused on bullying. The children were asked what they would say or do if they were playing outside at lunchtime and another child picked on them, and again, what their next action would be if their first response made no difference.

Sharing a Scarce Resource

Two-thirds of the children gave a polite initial response, with answers such as 'say please' or 'I'd like a turn'. This compares with the 80 percent who offered such an answer in the three younger phases, largely because more 10-year-olds would add a justification to their request (15 percent, compared with 8 percent at age 8), or negotiate (7 percent, compared with 2 percent at ages 6 and 8). Three percent would look for another source of supply.

Five percent would ask an adult to help them, much the same as at ages 8 and 6, but somewhat more than at age 5. Two percent of the children offered an aggressive response, compared with 1 percent at younger ages.

Most children do not try the same response twice. Only 12 percent of the children would keep making a social request if their first overture did not work. However, the proportions of children who would become passive (6 percent), or aggressive (5 percent) were much the same as at both earlier ages. Seven percent would look for another source of supply. Thirteen percent would add a justification to their request, and 7 percent would use negotiation (5 percent at age 8). One percent would ask another child to help. But—as in younger years—many children would turn to a teacher for help (46 percent).

Half the children who offered an aggressive response first would continue to be aggressive—a marked change from the pattern at age 8, when all but one of the initially aggressive children turned to their teacher for support. The other half would either turn to a teacher if their aggression did not meet with success, or become passive. Around 12 percent of those who first turned to a teacher for help and 10 percent of those who added a justification to their request tried aggression next.

Response to Bullying

Just under half the children were assertive in the face of bullying from a peer. Twenty-one percent would go somewhere else or do something else, a big jump up from 9 percent at age 8. Twenty-one percent would also seek the help of a teacher, slightly fewer than at age 8.

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[11] These tasks drew on the principle of the tasks we used at ages 5 and 6, devised by Spivack and Shure, as described in Holloway and Reichart-Erickson (1988).

Two percent would seek a friend's help, and 1 percent a group of friends. Five percent would meet bullying with aggression, and 3 percent did not know what they would do.

Second attempts to stop bullying become more teacher focused (55 percent). Much the same proportion would use evasion (going elsewhere or doing something else) as in the first attempt. Fourteen percent of the children would continue to respond assertively, somewhat lower than the 23 percent at age 8. Four percent of the children would show aggression, and 3 percent did not know what they would do. A third of the children who were aggressive in their response to being picked on would remain aggressive; the rest of this group showed patterns which were no different from others.

Individual Responsibility

Most children scored highly for the item 'follows class routines without having to be reminded'. The median score at age 10 on our measure of Individual Responsibility was 70 percent, the same as at age 8, and somewhat lower than the 83 percent at ages 5 and 6. This difference may reflect our addition of two new items to this measure at age 8, but may also indicate that teachers have higher expectations of 8- and 10-year-olds than they do of 6-year-olds.

Table 6

Individual Responsibility

Ranking → Item ↓	5 %	4 %	3 %	2 %	1 %
Keeps track of time, puts books away in right place	30	34	21	14	1
Clearly conveys own needs and feelings	16	36	32	16	1
Acts without thinking of consequences ^{R}	22	36	28	12	1
Follows class routines without having to be reminded	35	41	16	7	1
Gets on with work without distraction	20	44	23	12	1

R= reverse scored, 5= never, 1= always

Correlations between items ranged from r=0.15 to r=0.73. The highest correlation was between 'gets on with work without distraction', and 'follows class routines without having to be reminded'. There was also a high correlation between these 2 items and the ability of children to keep track of times and put books away in the right place.

Task–assessed Competencies

Mathematics, Literacy, Logical Problem-Solving, Fine Motor Skills

These 4 competencies were assessed by tasks carried out by the study children during the research interview. The average age when this interview took place was 10 years, with a spread of ages from 9 years 11 months (18 percent of the sample) to one child aged 10 years 6 months. Fifty percent of the study children were in Year 6, and 49 percent were in Year 5 classes when we interviewed them. Two children were in Year 3, and 4 were in other classes.

Mathematics

As at age 8, we used a reduced set of 20 items from the standardised PAT (Progressive Achievement Test) for Mathematics.[12] The items selected from the 58 items in the whole test for Year 5 and 6 students were those which were around the median in their level of difficulty (the proportion of students who got them right), and in their power to differentiate between students (high scorers overall got the items correct, and low scorers overall did not).

The mean raw score out of 20 was 12.65. The mean raw score of the study children who were in Year 5 was 12.06, and 13.21 for those in Year 6, around 10 percent more. Since different tests were used at age 8, no direct comparison can be made. However, the gap between Year 3 and 4 students was much smaller, only 3 percent.

Two-thirds or more of the children gave correct answers to questions focusing on numbers. Around half gave correct answers to questions focusing on equations.

The median score was 70 percent. The study children scored higher on 17 of the 20 items than did standard 4 (Year 6) students in the 1992 standardisation of the PAT Mathematics, with an average of 64 percent, compared with 56 percent, of correct items. A similar higher performance was found at age 8 on these PAT items. Three reasons for this, and for similar trends in the PAT Reading Comprehension and Burt Word Reading tests, are possible: the over-representation of high income children in our sample; better performance by this particular sample; or improvements in children's performance since 1992.

Literacy

We used four measures of literacy: the PAT Reading Comprehension test, the Burt Word Reading test, teacher's estimate of the child's reading age, and the same writing task used at age 8. The study children's age 10 scores show them to have made progress since age 8, and to be scoring somewhat higher than the norms for their age on the standardised reading tests.

PAT Reading Comprehension test

The PAT Reading Comprehension test has different questions for Year 5 and Year 6 students, with some overlap. The median score in percentile terms for both groups was 52 percent, 15 percentage points higher than the median percentile score of 37 percent at age 8. When we looked at the scores for each year on the 30 overlapping questions only, we found that Year 5 students had a median of 45 percent, compared with 60 percent for Year 6 students.[13]

Year 5 students' mean raw score (using form A) was 20.92, higher than the 17.63 mean raw score for standard 3 (Year 5) students on form A achieved in the 1990 NZCER review of PAT. The Year 6 mean raw score in this study was 21.37, slightly higher than the standard 4 mean raw score of the 1990 review, which was 20.08. The mean raw scores gave an average reading age level of 10–10½ years.

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[12] Use of PATs is much lower in decile 1–2 schools, with 52 percent of the study children in decile 1–2 schools having exposure to them in their age 10 classrooms, compared with 84 percent of decile 3–6 students, and 95 percent of decile 7–10 students in the study.

[13] We created one data-set for our analysis, combining both year levels, by adjusting the Year 5 student scores downwards by 8.5 percent, the mid-point of the 95 percent confidence interval between the Year 5 and Year 6 results on the 30 overlapping items.

Burt Word Reading Test

The Burt Word Reading test is a single test which does not change as children grow older. Children are asked to read a set of increasingly difficult words. Children's marks should increase as their word recognition skills increase, as they did in this sample.

At age 10, the median raw score on the Burt Word Reading Test was 67 percent, up from the median of 45 percent at age 8, and the median of 17 percent at age 6. One child got all 110 items correct, and the top quartile started at 79 percent, compared with 59 percent at age 8. The lowest quartile of children had scores at or below 35 percent at age 8; at age 10, this had shifted upwards to 51 percent.

The mean raw score was 71. This is somewhat higher than the mean raw score of 63.28 for students aged 10 years to 10 years 5 months in the New Zealand standardisation of Burt in 1980.[14]

Teachers' estimates of reading age

Teachers' estimates of children's reading ages tend to be higher than the PAT or Burt tests. The median on teachers' estimates of children's reading ages was 11½–12 years old, up from 9–9½ years at age 8. The full range of the estimates of the study children's reading ages is given in Chapter 13.

Writing

The writing test we gave was the same as the one used at age 8, but children were asked to provide longer pieces. The children were asked to write 15–20 lines[15] about one of their favourite books or television programmes, and to say what happened in it, and what they liked about it. A non-fiction topic was chosen to put boys and girls on an equal footing.

The median raw score on our writing test was 73 percent, up from 63 percent at age 8. Around half the children scored between 65 and 79 percent, a narrower spread than we had at age 8, when the spread for the two middle quartiles was between 50 and 73 percent. Average scores were slightly higher for the surface features than for the deep features.

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[14] Gilmore, A., Croft, C., & Reid, N. (1981). *Burt Word Reading Test. NZ Revision. Teachers' Manual.* Wellington: New Zealand Council for Educational Research, p. 2.

[15] At age 8, we asked for 10–15 lines. The test was devised by Cedric Croft, NZCER.

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Table 7

Writing task—Scores for Particular Features

Features	%
Surface features	
Length	
1–8 lines	2
9–14 lines	19
15+ lines	79
Spelling	
Many mistakes—some words recognisable	2
Many mistakes—most words recognisable	51
Up to 5 mistakes, including 3+ high frequency words	20
Up to 5 mistakes, including 3+ low frequency words	27
Punctuation	
Little/none	25
Indiscriminate mix	30
Use of stops followed by capitals, some other punctuation, some mistakes	40
All punctuation almost all correct—varied use of commas and quotation marks	5
Grammar and Syntax	
Little	2
1–2 correctly structured sentences	6
some understanding of parts of speech and sentence structure	32
only simple sentences correctly structured	17
three or more sentences of at least 2 clauses, appropriately linked	44
Deep features	
Vocabulary choice	
Mostly high frequency words	19
Five or more low frequency words, mainly contextually appropriate	60
Wide range of words, matching theme	21
Progression of story	
Unclear	13
Three or more sentences, some relevant explanation, no logical progression	25
Three or more sentences explaining story, a little logical progression	35
Story clearly explained—logical progression	28
Originality of thought	
No response	21
Bare response	11
One opinion, clearly expressed, some elaboration	41
Two opinions clearly expressed with justification	22
More than two opinions with reasons, further thought	4

The next table shows the correlations between these four assessments of the children's literacy at age 10. The correlations between PAT Reading Comprehension, Burt Word Reading, and the teacher assessment of children's reading age are quite marked. The writing task was slightly more correlated with the reading assessments at age 10 than at age 8.

Table 8

Correlations Between the Four Measures of Literacy at Age 10

	Burt word reading	Reading age	Writing
PAT Reading Comprehension	0.67	0.69	0.44
Burt Word Reading		0.67	0.45
Reading age			0.42

Logical Problem-Solving

The median score achieved here using the Standard Progressive Matrices (SPM) was 63 percent, an increase from the median of 48 percent at age 8, using the same test and scoring at both ages. The highest score out of 60 items was 55. The mean raw score of 36.8 was close to the mean raw score of 35.9[16] for the 10–10.5 year old group on which the SPM were normed for New Zealand children in 1984.

Fine Motor Skills

We used the Bruininks-Oseretsky Test of Motor Proficiency from the subtest for Visual-Motor Control, which has been standardised for the United States, not New Zealand. This gives the same test to children across different ages. The Competent Children project sample showed little additional growth between ages 8 and 10 on this test; they were already scoring highly at age 8.

The median score at age 10 was 88 percent. This is the same as when the children were aged 8, though the upper quartile was slightly higher (96 percent, compared with 92 percent at age 8), and all but one of the ten children with very low scores at age 8 had improved by age 10.

Almost all the children could cut out a circle and draw a straight line, and many could copy freehand a circle and triangle. Just over half could copy freehand a diamond or overlapping pencils without making an error. The lowest scoring item continued to be drawing a line through a curved path (without touching the sides of the path).

The mean raw score for this test was 20.7, s.d. 2.8, much the same as the mean raw score of 20.1, s.d. 2.5 for 10-year-olds in the US standardisation. However, where our sample remained much the same between ages 8 and 10, on average, the US sample scored lower at age 8 (17.6 at age 8, compared with the Competent Children project sample mean raw score of 20.1).

Relationships between Competency Scores at Age 10

Children have individual sets of strengths. A child with a high reading score can have quite a low score for social skills, and vice versa. We analysed the relationships between children's scores on our competency measures in a variety of ways, reported in more detail in Appendix 2.[17] A consistent set of patterns was found:

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[16] **The standard deviation for the study children was similar to the national standardisation, 9.4, compared** with 9.1 (NZCER (1984), *Standard Progressive Matrices—NZ Norms Supplement* Wellington:author, p. 9).

- Communication, Perseverance, Individual Responsibility, Mathematics and the three reading measures are the competencies which are most related to each other. Fine Motor Skills has little relation to the other competencies.
- However, the relationships between the competencies are not so close that a composite of them, rather than the individual competency measures, could be used in our analysis of the factors which are related to differences in children's scores. The principal components analysis we used identified a composite component, but this accounted for only 44 percent of the variance, or spread, of children's scores.[18] The fact that it included each of the competency measures, albeit giving somewhat more weight to the group identified above, suggests that each of the competency measures does indeed tap different aspects of children's performance, warranting separate analysis.

Summary

Most of the children in the Competent Children study showed familiarity with the demands of the school environment: they followed class routines without having to be reminded, they took responsibility for their own things, they completed work, listened to teachers, and showed them respect. The proportion of children who could always work with other children over an extended period of time without needing adult intervention had markedly increased since age 6 (18 percent, up from 12 percent). Most children were good at making and keeping friendships, and were unlikely to be led astray by peer pressure. Around 10–15 percent of the children showed signs of unease in the school environment or with their peers, scoring 2 or less on the 5 scale teacher ratings.

There were signs of growing confidence in solving issues with other children, with more children using justification or negotiation, but also signs that aggressive responses were becoming habitual for a small group of children. Most children thought of assertive responses to a hypothetical bullying situation; a substantial minority also dealt with bullying in that hypothetical situation by evasion.

Reading had progressed: the PAT Reading Comprehension median score at age 10 was 141 percent of the age 8 median score, and the Burt Word Reading test, 149 percent. writing scores had also increased, with slightly higher scores for the surface features of writing than the deep features. No direct comparison can be made of the Mathematics tests used, since different items were used each time. Scores on the Standard Progressive Matrices had also increased; age 10 scores were 131 percent of age 8 scores. There was little change on the Fine Motor Skills measures for most children, but 9 of the 10 children with very low scores at age 8 had improved over the two years.

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[17] We looked at the linear correlations between children's scores on each of the competency measures, in pairs, undertook a principal components analysis, and a factor analysis.

[18] We did include this principal component composite in our one-factor modelling, but it did not show any significantly different results from the simple composite competency, which is an average overall score consisting of the sum of 11 competency measures – dividing the Literacy competency into wrriting and reading, using the mean of the PAT Reading Comprehension and Burt Word Reading tests.

Fine Motor Skills stands out as the competency which is least related to the others we included in the study. By age 10, one might expect this, given that our measure focused on accuracy, and almost all the children could write legibly. But Fine Motor Skills has stood out from the other competency measures throughout the study: the children who showed most accuracy in their use of their hands at age 5 were no more likely to score well on our other competency measures than those who had yet to learn fine control. Neatness does not in itself appear to have spin-offs for knowledge, performance, or other kinds of skills.

In contrast, by age 10, there really are quite close associations between children's scores for Mathematics and literacy – particularly reading. These scores are also related to children's scores for Communication, Perseverance, and Individual Responsibility. Children's attitudes and approaches to classroom work are reflected in their performance in Mathematics and literacy – and vice versa.

In the next chapter, we turn to look at patterns of change between age 5 and 10 in more depth.

4 CHANGES IN THE COMPETENCIES OVER TIME

This chapter explores patterns of children's progress over time. Do children keep making progress at the same rate over their first five years of school – for example, does a child who scored highly for Mathematics at age 5 still score highly for Mathematics at age 10? Are there different patterns of performance over time for different competencies – say, Mathematics and communication?

First we present some simple correlations of scores at different ages, followed by regression analyses which incorporate children's earlier scores. Both those approaches assume a linearity in the measures, and in children's progression. To gain a fuller picture of how earlier performance relates to performance at age 10, we then focus on children's movement across quartile groups over time.

Attitudes, Behaviours, Social Skills

The next table shows the correlations between individual scores on the teacher-rated competencies, Communication, Perseverance, Individual Responsibility, Curiosity, Social Skills with Peers, and Social Skills with Adults, between the ages of 5 to 10. These correlations are not compelling, suggesting that children's experiences between the ages of 5 and 10, and the resources available to them that help shape those experiences, do matter. Given that different teachers rated the children, the lack of strong correlation over time is likely also to reflect different individual responses and interactions, as well as different settings.

Table 9

Correlations Between Social and Attitudinal Competency Scores between Ages 5 and 10

	Correlation between 5yrs & 6years Scores n=298	Correlation between 5yrs & 8yrs Scores n=281	Correlation between 5yrs & 10yrs Scores n=274
Curiosity	0.31	0.28	0.15
Perseverance	0.26	0.37	0.31
Individual Responsibility	0.13	0.28	0.27
Social Skills with Peers	0.25*	0.29**	0.34***
Social Skills with Adults	0.22	0.33	0.20
Communication	0.33	0.40	0.33

*n=297, ** n=280, *** n=273

There are 4 different patterns of progress evident in these correlations:

- The longer a child is at school, the larger the correlation for Social Skills with Peers.
- Individual Responsibility appears to be most volatile between ages 5 and 6, when children are settling into school. Correlations are higher, and apparently stable, between age 5 and ages 8 and 10.

- The greatest correlation for half of these competencies—Perseverance, Social Skills with Adults, and Communication—is between age 5 and age 8 scores. Again, the first school year shows volatility.
- An individual child's score for Curiosity at age 5 is much closer to their scores at ages 6 and 8 than at age 10: a declining pattern.

Overall, these patterns of the correlations between age 5 performance and subsequent performance after school attendance seems to indicate that there is a greater volatility in children's attitudes and social behaviours over the first year of school. This is borne out by the correlations in the next table, which show higher correlations between age 6 scores and children's later scores.

Table 10

Correlations for Social and Attitudinal Competency Scores Comparing Ages 6–8, 6–10, and 8–10

	Correlation between 6yrs & 8yrs Scores n=281	Correlation between 6yrs & 10yrs Scores n=274	Correlation between 8yrs & 10yrs Scores n=507
Curiosity	0.27	0.23	0.25
Perseverance	0.42	0.37	0.49
Individual Responsibility	0.41	0.36	0.55
Social Skills with Peers	0.30	0.29	0.46
Social Skills with Adults	0.35	0.31	0.36
Communication	0.45	0.41	0.46

The decline in correlations between age 5 and age 8 scores, and age 5 and age 10 scores, is not so clearcut. It may indicate that there was a greater consistency in early childhood education and primary teachers' expectations of classroom behaviour up to age 8, and that teachers' expectations of children changed around age 8, perhaps because by then they were undertaking more independent work, after they had mastered basic skills in reading and writing.

Certainly age 8 and age 10 scores also show markedly higher correlations compared with age 6 and age 10 scores for Perseverance, Individual Responsibility, and Social Skills with Peers, and slightly higher correlations for Curiosity, Social Skills with Adults, and Communication.

What can one take from these correlations? On the whole, they indicate that age 5 scores do not determine future scores—as one would hope, if school and further experience are to have an impact. By age 6, some attitudes, habits, and behaviours are becoming firmer, but not as strongly as they have by age 8. This would suggest that attention to these is probably most useful before the age of 8, but that things can also change after that age.

The next table shows the results of three regression analyses, to see whether earlier performance on the social and attitudinal competency measures can account for the variance in individual scores at age 10. The first column shows that age 5 scores account for very little of this variance. The second column shows that there is a marked leap in the proportion of the variance in age 10 scores accounted for when it is age 8 scores which are modelled: with Perseverance, we see only 9.7 percent of the variance accounted for by the age 5 score, but 24.4 percent by the age 8 score. The third column includes both age 5 and age 8 scores. By comparing the figures in columns 2 and 3, we can see whether the age 5 score is contributing something of its own to the variance in children's scores at age 10. Continuing with Perseverance, we see that 20.8 percent is less than 24.4, and thus it appears as if age 5 performance does not make a separate contribution to age 10 scores. It does seem to add something more, however, to age 10 performance on our measures of Social Skills with Peers, Social Skills with Adults, and Communication.

Table 11

Earlier Scores' Contribution to Age 10 Social and Attitudinal Competency Scores

Competency	Percent variance accounted for by the linear association – ages 10 & 5	Percent variance accounted for by the linear association – ages 10 & 8	Percent variance accounted for by the linear association – ages 10 & (5 + 8)
Curiosity	2.2	6.1	6.1
Perseverance	9.7	24.4	20.8
Individual Responsibility	7.4	30.2	27.9
Social Skills with Peers	11.6	20.8	24.3
Social Skills with Teachers	3.9	12.8	16.9
Communication	11.1	21.3	22.7

However, though age 8 performance on these attitudinal and social measures is closer to age 10 performance, it does not provide a tight prediction of a child's current score at age 10. For example, while the highest correlation between ages 8 and 10 scores was for Individual Responsibility, r=0.55, the scores of the children who scored highly (around 80 percent) on this measure at age 8 ranged from 40 to 100 percent at age 10. What we can say is that it is relatively unlikely that a child scoring at 80 percent for Individual Responsibility at age 8 will score below 50 percent at age 10.

Mathematics, Literacy, Logical Problem-Solving, Fine Motor Skills

Apart from Fine Motor Skills, there was more consistency between age 5 and age 10 scores on the competencies measured by children's scores on the tasks they did themselves than on the teacher-rated competencies.

Table 12

Correlations between Children's Task-rated Competency Scores Age 5-Age 10

	Correlation between ages 5 & 6[19] scores n=298	Correlation between ages 5 & 8 scores n=281	Correlation between Ages 5 & 10 scores n=274
Mathematics	0.69	0.57	0.58
Fine Motor Skills	0.33	0.35	0.23
PAT Reading Score *(cf. Early Literacy at age 5, cf. Burt Word Recognition at age 6)*	–	0.41	0.43
Burt Word Recognition Test *(cf. Early Literacy at age 5, cf. Burt Word Recognition at age 6)*	0.45	0.39	0.41
Writing Score *(cf. Early Literacy at age 5, cf. Burt Word Recognition at age 6)*	–	0.36	0.31
Reading Age *(cf. Early Literacy at age 5, cf. Burt Word Recognition at age 6)*	–	0.37	0.46
Logical Problem-Solving	0.37	0.34	0.39

r=0.43 for Invented Spelling at age 6 & Early Literacy at age 5. Invented Spelling was not used to compare with anything at age 8.

The higher correlations found for these measures may simply be due to their more standardised nature—and the more context-dependent nature of judgements on attitudes and social skills. The tasks themselves, however, changed over time, to reflect children's growing mastery, and the availability of valid standardised tasks for later ages.

It seems likely that the measures of Mathematics, literacy and Logical Problem-Solving also show more consistency because they draw on knowledge and experiences prior to schooling. This is borne out by the much higher proportion of variance accounted for in the age 10 scores by age 5 scores for Mathematics, and the reading measures, and Logical Problem-Solving, compared with the proportions found for the social and attitudinal competencies, and the fact that age 5 scores make a separate contribution to the variance in children's age 10 performance for all but Fine Motor Skills.

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[19] These correlation levels are comparable to those reported by de Lemos & Doig (2000, p. 6) in relation to ACER's *Who am I* test for Australian school entrants, and scores on literacy and Mathematics tests six months later. They note that other findings 'generally indicate correlations of between .4 and .6 between various measures of development of 'readiness' and subsequent school achievement' (ibid).

Table 13

Earlier Scores' Contribution to Age 10 Cognitive and Motor Skills Scores

Competency	Percent variance accounted for by the linear association – ages 10 & 5	Percent variance accounted for by the linear association – ages 10 & 8	Percent variance accounted for by the linear association – ages 10 & (5 + 8)
Mathematics	32.2	51.6	56.5
Fine Motor Skills	3.2	8.0	7.4
PAT Score	18.4	50.7	55.8
Burt Word Reading Tests	14.7	72.7	73.4
Writing Score	7.6	17.2	22.7
Reading Age	20.9	44.5	48.4
Logical Problem-Solving	13.6	44.0	50.1

This table also shows that age 8 scores are accounting for a reasonable proportion of the variance in children's scores at age 10 in Mathematics, literacy, and Logical Problem-Solving.

Age 8 scores are also accounting for more of the variance in children's scores at age 10 than their age 5 scores. When does this closer relationship between prior and later performance start to happen?

The next table shows correlations between age 6 and age 10 scores, and age 8 and age 10 scores. If we compare the correlations between age 6 and age 10 with those in table 13, between age 5 and age 10, we see that there is a closer match between age 6 and age 10 performance. The relationship between age 8 and age 10 scores is even closer, for everything except writing.

Table 14

Correlations between Children's Cognitive and Motor Skills Scores Ages 6–8, 6–10, and 8–10

	Correlation between ages 6 & 8 scores n=279-281	Correlation between ages 6 & 10 scores n=270-274	Correlation between ages 8 & 10 scores n=499-507
Mathematics	0.60	0.62	0.72
Fine Motor Skills	0.28	0.15	0.28
PAT Reading Score (age 10)	–	0.58	0.71
Burt Word Recognition Test (cf. Burt Word Recognition age 6)	0.78	0.70	0.85
Writing Score (cf. Burt Word Recognition age 6)	0.50	0.41	0.42
Reading Age (cf. Burt Word Recognition age 6)	0.68	0.56	0.67
Logical Problem-Solving	0.48	0.44	0.66

r=0.43 for Invented Spelling at age 6 & Early Literacy at age 5. Invented Spelling was not used to compare with anything at age 8 and 10.

* There were 187 children in the comparison of Age 10 PAT questions in common with Age 5 Early Literacy, 193 with age 6 Burt Word Recognition and 378 with age 8 PAT score.

Thus compared to the attitude and behaviour competencies, there does seem to be a stronger case for a 'window of opportunity' for the development of knowledge and skills in mathematics and literacy, which are essential competencies in contemporary life, particularly in the 'knowledge society' seen as pivotal to New Zealand's economic vitality. The window is not yet firmly shut between 8 and 10 on the opportunity to ensure that children have solid grounding in mathematics and literacy, but it is becoming much narrower.

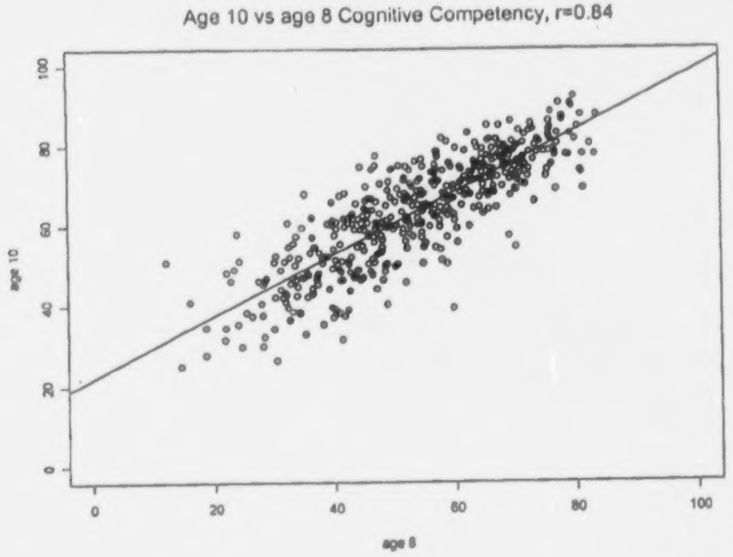
The weight of these first three years of school for children's ongoing learning suggests that recent policy initiatives which focus on the transition to school and early literacy and mathematics are vital, and need to be maintained. They also suggest the importance of developing related resources, accompanied by professional development, for early childhood education teachers.

The significance of the first few years of children's schooling is illustrated in the next set of graphs, which show the correlations between the cognitive competency scores at each age (the combined average score for Mathematics, the literacy measures other than reading age, and Logical Problem-Solving).

We start with the relation between age 8 and age 10 performance: note the tight clustering of scores around the line.

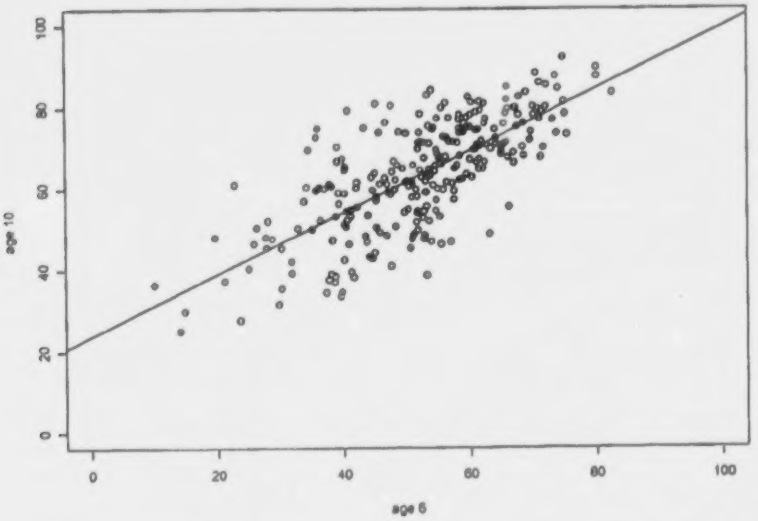
Figure 2

Correlations Over Time for the Cognitive Competency Score



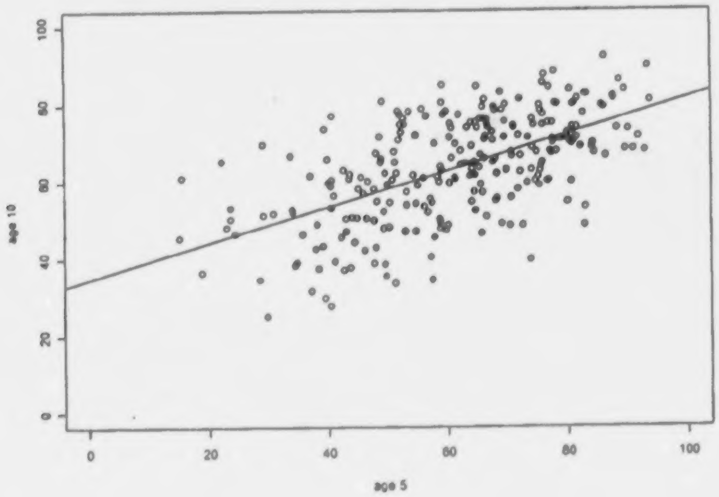
In the next graph, we see that the clustering around the line is looser—more of the scores are further away from the line.

Age 10 vs age 6 Cognitive Competency, r=0.73



In the third graph, the slope of the line is not as sharp, and the scores are more scattered than they were in the first two graphs.

Age 10 vs age 5 Cognitive Competency, r=0.58



The Inter-relation of Competency Movements Over Time

What about the relation of children's performance on one competency measure at a prior age, and their performance on other measures at age 10? To see if these are related, we used an analysis which groups scores in quartiles, and weights movements of children across quartiles.[20] In our analysis, we 'penalised' most strongly differences of 3 quartiles between estimates of children's performances, and their actual performances. In other words, the larger the numbers of children moving from the lowest to the highest quartiles, and vice versa, between the age of 5 and 10, the less useful is the age 5 performance to predict the age 10 performance. We took an association of 0.25 as a reasonable—but not high—predictive association.

We found three groups among the competencies. The first group was able to provide reasonable associations for 8–9 of the 13 measures we used; the second, reasonable associations for 5–6, or slightly less than half of the 13 measures; and the last group, reasonable associations for less than 3 of the measures.

Table 15

Predictive Factors Age 5—Age 10

Fair predictors *(for 8–9 of the 13 measures)*	Medium predictors *(for 5–6/13 measures)*	No predictive value *(for 0–3/13 measures)*
Mathematics	Communication	Curiosity
Literacy (3 reading measures & writing)	Perseverance	Individual Responsibility
Social Skills with Peers	Logical Problem-Solving	Social Skills with Adults
		Fine Motor Skills

This shows that children's mathematical and literacy performance before they reach school, and their social skills with peers, also have a bearing on their performance in the other competencies we measured. This analysis underlines the importance of children's relative knowledge and skills before they reach school, particularly in mathematics and literacy, and the importance of interaction with other children. This also points to the importance of ensuring that early childhood educators are given appropriate curriculum resources and professional development to ensure that they can build children's knowledge and skills.

Language is a key aspect of mathematics, as well as literacy, and it is also key in social skills with peers, and in communication, which features in the second group of competencies that provide some prediction of children's later performance in other competencies.

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[20] This method of analysis provides more sophistication than simply matching quartiles. It is drawn from a measure originally devised for use in assessing the match between forecast weather and actual weather. See Gordon, N. R. (1982), Evaluating the Skills of Categorical Forecasts", *Monthly Weather Review* Vol.110 No. 7, July 1982, pp. 657–661, American Meteorological Society. This measure quantifies the relationship in a contingency table with respect to the degree to which one dimension can be considered to be linked with the other.

Movement Between Quartiles

There is evidence from studies of Mathematics and reading that there are different patterns of performance for children who start school with different levels of knowledge and skills, particularly for those children who start school with performance which is much lower than others (Case, Griffin, & Kelly, 1999; Young Loveridge, 1991).

In this study, we also find different patterns of performance. We have analysed these patterns by focusing on the rate of retention over time within quartiles (the proportion of children who stay in the same quartile), and the rate of movement from the lowest to the highest quartile and vice versa, over the same period. We estimated the figures one would expect to be retained, or to make large movements between top and bottom quartiles, if these patterns occurred due to chance, then compared that with the actual figures. The difference between these two, or the 'departure' from the estimate then gives an indication of the underlying patterns of progress.

We used movement over time in relation to quartiles because of the changes in the measures of children's performance. This means that we are looking at children's performance relative to each other, rather than to some pre-defined standard. Theoretically, this means that bottom quartile performance could be quite high in relation to any such standard. In practice, bottom quartile performance on our measures does indicate low performance in relation to our measures: it means, for example, that for the Burt Word Reading test, children were recognising words at a level two years below their chronological age.

Table 16 shows the departures, or differences, between the actual number of children in the study in a particular group, and the estimated number in that group which could be expected if the patterns were entirely due to chance. A departure of around 8 indicates a significant difference for our sample size. Table 16 shows these in bold type.

Children were more likely to stay in the same quartiles if they started in the lowest and highest quartiles, particularly for Mathematics and the literacy measures. It is more unlikely that children who scored in the top quartile at age 5 (quartile 4) will have scores in the bottom quartile at age 10 than that children who scored in the bottom quartile at age 5 (quartile 1) will have scores in the top quartile at age 10.

Table 16

Retention and Changes Between Ages 5 and 10 – Departures from Estimate

Retention and Changes from age 5 to age 10→ Competency↓	Stays quartile 1→1 Departure from estimate	Stays quartile 2→2 Departure from estimate	Stays quartile 3→3 Departure from estimate	Stays quartile 4→4 Departure from estimate	Upward progress, quartile 1→4 Departure from estimate	Declining progress, quartile 4→1 Departure from estimate	Unlikely extreme movements (1→4, or 4→1) Departure from estimate
Curiosity	0.7	-8.4	10.4	4.6	-5.3	-2.3	Neither
Perseverance	6.6	-6.0	-0.2	11.1	-13.3	-12.0	Both
Individual Responsibility	14.3	7.7	-2.6	9.8	-3.3	-13.7	hi→lo
Social Skills with Peers	8.8	0.0	1.6	8.5	-6.0	-15.9	hi→lo
Social Skills with Adults	11.3	3.3	1.2	-0.9	-7.0	-12.7	hi→lo
Communication	9.9	-0.7	0.5	15.5	-10.8	-12.6	Both
Mathematics	31.5	5.6	9.6	23.5	-16.3	-19.1	Both
Fine Motor Skills	8.8	2.5	2.2	5.2	-2.0	-11.0	hi→lo
PAT Reading Score	27.9	2.1	-0.4	16.6	-17.3	-19.4	Both
Burt Word Reading Test	18.2	5.0	1.4	18.5	-18.4	-15.6	Both
Writing Score	16.1	-4.9	1.6	5.1	-14.9	-13.2	Both
Reading Age	24.2	5.2	10.6	23.9	-16.1	-13.9	Both
Logical Problem-Solving	19.5	14.2	4.6	14.1	-9.4	-18.4	hi→lo

Between ages 8 and 10, the proportion of children who stay within the same quartile becomes much more pronounced, and is now evident for the two middle quartiles, though at a much lower rate, as well as for the top and bottom quartiles (Table 17). The separately boxed entries show particularly high retention rates.

Table 17

Retention and Departures from Expected Percentages Between Ages 8 and 10

Retention and Departures from age 8 to age 10→ Competency↓	Stays quartile 1→1 Departure from estimate	Stays quartile 2→2 Departure from estimate	Stays quartile 3→3 Departure from estimate	Stays quartile 4→4 Departure from estimate	Upward progress, quartile 1→4 Departure from estimate	Declining progress, quartile 4→1 Departure from estimate	Unlikely Extreme Movements (1→4, or 4→1) Departure from estimate
Curiosity	12.6	3.6	2.5	11.1	-10.3	-5.7	lo→hi
Perseverance	23.7	6.8	7.9	25.3	-14.8	-15.7	Both
Individual Responsibility	26.2	3.4	4.7	20.0	-15.8	-19.8	Both
Social Skills with Peers	21.5	4.0	5.6	19.8	-13.4	-21.4	Both
Social Skills with Adults	30.3	10.8	2.2	22.6	-17.8	-19.3	Both
Communication	23.0	-0.5	5.9	15.7	-14.3	-17.2	Both
Mathematics	$\boxed{44.4}$	19.5	9.9	$\boxed{35.3}$	-21.2	-23.5	Both
Fine Motor Skills	9.6	3.9	4.7	10.8	-6.7	-9.6	hi→lo
PAT Reading Comprehension	$\boxed{37.1}$	15.3	17.3	$\boxed{42.5}$	-21.9	-23.4	Both
Burt Word Reading Test	$\boxed{50.4}$	25.6	27.9	$\boxed{50.0}$	-22.2	-25.9	Both
Writing	19.4	7.9	-1.2	15.8	-14.0	-12.5	Both
Reading Age	$\boxed{39.8}$	10.4	17.4	$\boxed{34.5}$	-17.5	-25.2	Both
Logical Problem-Solving	$\boxed{36.1}$	22.0	16.6	32.2	-18.0	-22.8	Both

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Patterns of Improvement for Initially Low Performing Children

Another way to look at the consistency of children's performance over the five years between age 5 and age 10 is to look at movement across the median line. This indicates a performance which improves from below average to above average. Table 18 contrasts patterns for children in the bottom (1) and top (4) quartiles at ages 5 and 8 with their performance at age 10.

Table 18

Retention and Movement of Children in Quartiles 1 and 4 at Age 5 and 8, in relation to the Median at Age 10

Retention and Movement → Competency ↓	% of quartile 1 at age 5 above median at age 10	% of quartile 1 at age 8 above the median at age 10	% of quartile 4 at age 5 above the median at age 10	% of quartile 4 at age 8 above the median at age 10
Curiosity	35	31	45	60
Perseverance	21	13	51	60
Individual Responsibility	35	18	60	70
Social Skills with Peers	41	30	64	71
Social Skills with Adults	34	23	56	80
Communication	34	27	65	66
Mathematics	15	6	83	85
PAT Reading Comprehension	18	8	72	92
Burt Word Reading	32	5	55	99
Writing	23	23	40	65
Reading Age	24	10	60	77
Logical Problem-Solving	33	13	70	91

This table shows that most of the children who were scoring highly for Mathematics and early literacy continued to score well five years later. Interestingly, the consistency was higher for reading comprehension than for vocabulary. High scores on our early literacy measure were less predictive of good performance for writing five years later. Around 50–65 percent continued to score well for the social and attitudinal competencies.

By contrast, few of those who scored poorly for Mathematics and early literacy before they started school improved sufficiently to score well—above the median—at age 10. Their chances of improving their scores were higher for the other competencies—more so for word recognition than writing. But their chances were still less than half.

Between ages 8 and 10, there is considerable firming, particularly in relation to the literacy measures, and most of the social and attitudinal measures. Mathematics is the only competency to show little change between ages 5 and 10, and ages 8 and 10—for the original high performers. But those who were in the bottom quartile for Mathematics at age 8 are even less likely to be able to move forwards.

What does this mean in terms of the proportion of children who *do* move ahead from the bottom quartile? If the movement was entirely by chance, and unaffected by either their performance at age 5—their then existing knowledge, confidence, and skills—or by factors in their lives between the ages of 5 and 10, one would expect half these children to be performing above the median score for the Competent Children project sample. In the event, we see far fewer than this.[21]

Summary

There are several conclusions here. First, children's progress is not fixed by age 5. But early childhood experience, including early childhood education, is persistent. Children do make progress at school, but the amount and pace of that progress reflect or are to some degree dependent on what they bring with them to school. This is particularly striking with mathematics.

Second, the patterns here show something of the volatility of the first year at school, particularly for the social and attitudinal competencies. They also suggest that there is some kind of further transition made between ages 8 and 10: that teacher expectations (and standards) do change, as children can use the reading and writing skills they have (mostly) mastered.

Third, the lack of strong correlations across years for the social and attitudinal competencies does indicate the importance for children of their specific environments, and interactions with teachers and peers. Children are reacting to differences they encounter through their school career; their behaviour reflects the environments, frameworks, and values they encounter, as much as any predisposition or character.

These conclusions underline the importance of the recent policy focus on the first few years of school, and on better equipping children's teachers, first, to gauge what knowledge individual children actually have when they reach school (e.g. through the *School Entry Assessment* package, or through the sharing of information between early childhood education teachers and primary teachers, for example, using material about children gained from the current work by Margaret Carr on exemplars of early childhood education assessment); and second, to support their literacy and mathematics development (e.g. through the new *Count me in* mathematics resources and associated professional development).

They also point to the need to develop similar resources for early childhood education teachers, and to work further on providing parents with the confidence, knowledge, and skills to use mathematics in everyday life with their young children, perhaps through working with early childhood education teachers, as well as through such campaigns as *Feed the Mind*.

It is not clear why mathematics should stand out so clearly as the competency that is most dependent on knowledge and skills learnt or practised before school. Is it that New Zealand has paid more attention to literacy in the past, so that reading to children is now seen by many parents to be as much a part of caring for young children as changing their nappies? Is it that New Zealand adults are more confident with words than with numbers and patterns? If the

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[21] Chapter 15 includes modelling of age 5 scores in relation to age 10 scores, and shows some factors which appear to make a positive difference to those who achieve much higher scores than their initial scores at age 5 would have suggested. This is an area, however, which calls for further analysis, and the collection of further, more qualitative data.

Competent Children project was repeated in 10 years' time, after much policy attention to mathematics in the early years, would we find that mathematics no longer stood out?

The greater variability in teacher ratings of children's social and attitudinal competencies also underlines the importance of sustaining educators' attention to the role of the environment they and their school provide children, and the importance of their interactions with individual children, whose characters—at least for the aspects we have included in this study—are not fixed at 5 years, let alone 10 years.

5 CHILDREN'S CHARACTERISTICS

In this chapter we look at gender, ethnicity, first language, and health.

Gender

Gender differences in achievement at primary school have generally shown higher performance by girls, particularly for literacy (Alton-Lee & Praat, 2000).

We found no difference between boys and girls before they started school, with the exceptions of Curiosity (boys were given higher ratings than girls), and Perseverance (girls were given higher ratings than boys). At age 6, however, only Mathematics and Fine Motor Skills were not associated with gender.

In contrast to our findings at age 8, the parents of the study boys were just as satisfied with their school progress at age 10 as the parents of the study girls. Yet boys' average scores at age 10 continued to be lower for all the competency measures, other than Mathematics, where there was no gender difference,[22] and Curiosity, where they had higher scores than girls.

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[22] Crooks & Caygill (1999, p. 13) sum up the NEMP patterns related to gender: 'Overall, these results suggest that literacy skills (and particularly writing) is the only area in which major concern about the relative achievement of boys and girls at primary school is clearly justified.' This is consistent with the Competent Children results, at least in terms of the curriculum.

Table 19

Gender and Children's Competencies at Age 10

Gender→ Age 10 Competency↓	Female *mean* n=239	Male *mean* n=268	Probability of F-value from anova	Percent variance Accounted for[23]
Curiosity	61.8	**66.0**	0.010	1.3
Perseverance	**75.7**	65.1	0.0000000006	7.3
Individual Responsibility	**76.5**	60.8	0	17.1
Social Skills with Peers*	**72.3**	65.5	0.00000000004	8.3
Social Skills with Adults*	**79.7**	71.1	0.00000003	5.9
Communication*	**74.9**	67.4	0.0000001	5.4
Fine Motor Skills*	**87.5**	84.9	0.018	1.1
Literacy—PAT Reading Comprehension	**52.7**	45.7^^^^^^	0.0003	2.6
Literacy —Burt Word Reading	66.4	63.0	0.028	0.9
Literacy —writing*	**73.5**	68.9^	0.00002	3.5
Literacy —reading age	**11yr8mth**	11yr1mth	0.0003	2.6
Logical Problem-Solving*	62.9	59.9	0.022	1.0
Composite Competency*[24]	**71.8**	66.3^^^^^^^	0.00000001	6.5
Composite Cognitive Competency*	**65.2**	61.8^^^^^^^	0.0104	1.7
Composite Social & Attitudinal Competency*	73.5	66.0	0.0000000002	7.7

- In these cases the squared model was a better fit. ^ one fewer child in this mean, ^^ two fewer children in this mean, ^^^ three fewer in this mean, etc. The highest scores for each competency are in **bold type**.

These gender-related differences in scores remained after taking family income and maternal qualification into account.[25] Why should these different patterns exist?

Fergusson and Horwood (1997), analysing their longitudinal Christchurch Health and Development Study data, found that boys' lower scores for cognitive measures, school certificate grades, and their greater likelihood of leaving school without a qualification were attributable to their lower levels of attention and conduct, as rated by teachers. This finding is consistent with the patterns evident in our data. Teachers' views also show some mismatch between the behaviour of some boys, and the kind of behaviour which allows children to make the most of the way school work is organised. Alton-Lee & Praat (2000, 273–275) cite research suggesting that the resistance of some boys to the structures of school life may have its origins in identification of masculinity with competitive demonstrations of strength. It would certainly be interesting to know more about the values, games, role of peers, and aspirations of boys with different levels of performance.[26]

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[23] This shows the results of one-factor modelling; the figures in the final column should not be read additively, and they are not intended to sum to 100 percent. They allow the comparison of the mathematical contribution of gender to different competencies (e.g. this comparison shows that gender makes a greater contribution to explaining the variance in individual scores for Individual Responsibility than for writing).

[24] The *Composite Competency* is an average score consisting of the sum of each of eleven competencies, dividing Literacy into two aspects, reading and writing, and for reading, excluding the measure of teacher's perception of reading age and using the mean of the PAT and BURT word reading tests together. The *Composite Cognitive Competency score* is another average score, formed as the average of the sum of the results for Mathematics, Reading, writing, and Logical-problem-solving. The *Composite Social & Attitudinal Competency* score is the average of the sum of the remaining competencies, with the exception of fine motor skills. It combines the scores for Perseverance, Individual Responsibility, Communication, Social Skills with Peers, Social Skills with Adults, and Curiosity.

[25] There was a suggestion of an interaction with Mathematics, although the numbers in each cell size suggest caution: while there was a large difference between the Mathematics scores of girls and boys whose mothers had a mid-school qualification (69 percentage points compared with 55 percentage points), the reverse was evident for the next level of qualification, with daughters of mothers with a senior school qualification (but n=6) scoring 46 percentage points, compared with 75 percentage points for boys (n=12).

Teacher Views

Boys were twice as likely as girls to be described by their teachers as having an overall level of achievement that was less than average or medium (17 percent, compared with 8 percent of girls). Thirty-eight percent of the girls were described as having a very good or excellent overall level of achievement, compared with 24 percent of the boys in the study.

Eighty percent of the children were taught by women. Twenty-two percent of the boys had a male teacher, and 18 percent of the girls.

Nash (forthcoming) suggests that one of the reasons for boys scoring lower on the competency measures in the Competent Children project is that they are being judged in female terms. To check this out, we compared the ratings of male teachers and female teachers separately, in terms of their judgements of boys and girls. Since the ratings do not apply to the same boys and girls, differences in ratings which are related to gender are not ruled out of possibility, but it does seem as if women are no harder on boys than men are, except in terms of overall achievement. Schools and classwork may be easier for those who can show the self-management skills that are identified as useful there (as they are in many workplaces), but this is another matter.

Ratings of Boys

There were only four differences between female and male teachers in their ratings for the 31 items included in the competency measures. Female teachers gave higher ratings than male teachers to boys for:

- Curiosity (*does x take an active interest in his surroundings*)
- Perseverance (*does x make an effort to do something even if he doesn't feel confident about it)*
- Individual Responsibility (*does x clearly convey his feelings)*
- Communication (*If x does not understand what someone has said, will he ask for it to be repeated or explained)*.

However, in terms of overall level of achievement, female teachers identified 21 percent of boys as below average, while male teachers identified only 5 percent. There were no significant differences at the top end of the scale.

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[26] Some might argue that schools should be differently structured, to better suit boys who do not take to being structured. One difficulty with this conclusion is that most boys do in fact take to school as well as girls do, on the whole; the question might be how to offer a greater sense of freedom and mobility, while providing frameworks which allow the growth of the skills and habits which are needed to support the full development of talent.

Ratings of Girls

Girls were rated more highly by female than by male teachers on these items:

- Individual Responsibility (*does x clearly convey her feelings)*
- Social Skills with Peers (*is she good at making and keeping friendships)*
- Social Skills with Adults (*does x ask teachers for a hand or information when she needs it; does she show respect for teachers – is she courteous)*
- Communication *(can she be relied on to pass messages from one person to another without getting it mixed up; is her speech easily understood even by people who haven't met her before; does she vary her speech to help get ideas across).*

In terms of overall achievement, women teachers did rate girls more highly, but they also identified more girls (9 percent) as below average, whereas male teachers identified only 2 percent of girls as below average.

But both male and female teachers' views may reflect shared cultural values, as well as the shared structure of schools and classrooms, and the nature of school work. Some of the traditional views of gender attributes were evident in teachers' descriptions of the study children's strengths.[27]

Gender and Teachers' Views of Children's Strengths and Difficulties

The areas where boys and girls were seen as equally strong were:
oral language, music, art, drama, social studies, te reo Maori, and religious studies.

Areas where more boys were reported as having strengths were:
mathematics,[28] *science, technology, physical education, problem-solving/lateral thinking, and information technology or computers.*

Areas where more girls were reported as having strengths were:
Reading, story writing, other writing, handwriting or printing, spelling, and health.

Forty-seven percent of the girls had no difficulty evident to their teachers in any curriculum area, compared with 30 percent of the boys. Boys' main areas of difficulty were related to literacy. However, girls were not reported to have a higher rate of problems with the curriculum areas identified as strengths for boys, including Mathematics and science.

Boys were slightly less likely to do their homework all the time: 67 percent, compared with 77 percent of girls.

Teachers' views of children's character strengths showed no difference between boys and girls in terms of their good behaviour, independence, leadership, kindness, willingness, popularity, or trying hard. But girls were almost twice as likely to be seen as having strengths of organisation and concentration (31 percent, compared with 18 percent of boys), and to be reliable or sensible (39 percent, compared with 27 percent of boys). Around twice as many boys as girls were seen to possess a sense of humour (20 percent, compared with 11 percent).

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[27] Teachers' views of children's curriculum and character strengths and weaknesses were given in response to open-ended questions.

[28] This is particularly interesting, given that boys perform no differently from girls on our Mathematics measure, and perform much the same as girls (a +.01 advantage) on the NEMP mathematics tasks at Year 4 (Crooks & Caygill 1999, p. 13).

Poor work habits were identified as a difficulty for 40 percent of the boys, compared with 19 percent of the girls. Boys were also twice as likely as girls to be seen as immature or easily led astray (18 percent, compared with 8 percent of girls). Nine percent of the boys could be aggressive, compared with 1 percent of the girls, and 5 percent seemed to live in their own world, compared with 1 percent of the girls.

These traits came to the fore when teachers were asked to describe the main obstacles to the children achieving their full educational potential. Poor self-management skills were mentioned for 37 percent of the boys (compared with 18 percent of the girls). Fifteen percent of boys seemed more interested in things outside education (compared with one of the girls), and 13 percent possessed poor social skills (compared with 6 percent of the girls).

Gender and Children's Views of School and Home

On the whole, there were few differences between boys and girls in their perception of school. Boys were more likely to feel school offered them interesting things to do only sometimes or never (30 percent, compared with 19 percent of girls), with a similar but more muted response to enjoying themselves at school (22 percent, compared with 11 percent of girls, enjoyed themselves only sometimes, or never). But boys were more likely never to feel lonely at school (66 percent, compared with 51 percent of girls). Almost half the girls said they always kept out of trouble at school, compared with 24 percent of the boys.

There were no gender-related differences in being picked on or bullied, or where it happened. But boys were almost twice as likely to be subject to physical bullying (15 percent, compared with 8 percent of girls). Contrary to some perceptions, boys were just as likely to report verbal bullying as girls, whether as victims or as bullies.

Boys and girls gave similar views of their experiences at home. The only item which differed was that boys were somewhat more likely to feel they did not do lots of good things with their family (37 percent, compared with 25 percent of girls). So school is not the only part of their lives where boys are more likely to seek more activity or diversion.

There are also some differences in activities outside school for the girls and boys in the Competent Children project at age 10, and some of the activities which were positively associated with children's performance on the competency measures were more likely to attract girls. These are reported in detail in later chapters.

One wonders whether some of the gender differences that are evident might reflect different experiences and opportunities to develop the habits, attitudes, and 'discipline' which are valued and support classroom learning and many workplace expectations.

Gender and Patterns of Children's Progress

What about different patterns of progress *within* each gender? Delving further than the average scores, and looking at progress in terms of movements from the top and bottom quartiles at ages 5 and 8 in relation to scores at age 10, show some patterns which are consistent with the overall picture, as well as some patterns which may surprise.

At age 10, girls who started in the bottom quartile at age 5 were more likely than boys to remain there for Literacy—other than the teacher-rated reading age. Boys who started in the bottom quartile for Logical Problem-Solving, Communication, and Perseverance were more likely to remain there at age 10. Boys who started in the top quartile for Mathematics at age 5 were more likely than girls to be there also at age 10.

The analysis reported below is based on comparisons of the percentage of children of a given group (e.g. girls) in each quartile, and estimates of the percentage of children we would expect to find in that quartile, if movement from one quartile to another occurred by chance. The difference or 'departure' between these two figures is used in Table 20, and gives a measure of the 'retention' of a child within their earlier quartile, or the movement from one end of the scale to the other. A minus sign (–) indicates that the departure is in the negative direction, i.e., that the observed percentage for a given group is less than expected by chance. For example, we found that 13 percent fewer of the girls who had been in the lower quartile at age 5 for Mathematics progressed to the top quartile at age 10 in Mathematics than if their movement had been by chance.

Within each gender, differences of more than about 13 indicate a statistically significant difference. Only significant departures are reported in the table below. There were no significant within-gender differences in movement over time for Social Skills with Peers, Fine Motor Skills, or Individual Responsibility.

Table 20

Retention and Movement Across Quartiles Ages 5–10 for each Gender

Departures → Competency ↓		Departures for quartile 1 retention	Departures for quartile 4 retention	Departures for movement from quartile 1 to quartile 4	Departures for movement from quartile 4 to quartile 1
Mathematics	*Girls →*	31.1	18.6	-13.0	-24.8
	Boys →	30.4	27.9	-17.9	-14.1
PAT Reading Comprehension	*Girls →*	29.8	17.7	-20.0	-27.3
	Boys →	21.5		-13.6	
Burt Word Reading	*Girls →*	29.9	15.0	-24.3	-16.0
	Boys →	12.2	22.3	-15.8	-15.1
Writing	*Girls →*	31.9	17.7		
	Boys →	14.5		-18.3	
Reading Age	*Girls →*	18.4	26.4	-17.1	-20.5
	Boys →	26.6	21.2	-15.7	
Perseverance	*Girls →*				
	Boys →	17.1		-15.1	
Communication	*Girls →*				
	Boys →	24.2		16.5	
Logical Problem-Solving	*Girls →*				
	Boys →	29.8			-22.4
Social Skills with Adults	*Girls →*				-19.5
	Boys →				

Departures for quartile 1 retention: difference between observed and expected percentages of children in the lowest quartile group at both ages 5 and 10.

Departures for quartile 4 retention: difference between observed and expected percentages of children in the highest quartile group at both ages 5 and 10.

Departures for movement from quartile 1 to quartile 4: difference between observed and expected percentages of children moving from the lowest quartile group at age 5 to the highest quartile group at age 10.

Departures for movement from quartile 4 to quartile 1: difference between observed and expected percentages of children moving from the highest quartile group at age 5 to the lowest quartile group at age 10.

If we look at the movement between ages 8 and 10, we see that boys who were in the bottom quartile at age 8 were more likely to remain there at age 10 for social and attitudinal competencies, with the exception of Communication. They were more likely also to remain there for writing and reading age. But girls whose scores were in the bottom quartile at age 8 for Mathematics and the Burt Word Reading test were more likely than boys to remain there at age 10.

Movement from the bottom quartile at age 8 to the top quartile at age 10 is similar for both boys and girls, with the exceptions of lower rates of this great progress for boys in Communication, Individual Responsibility, writing, and reading age.

Girls who started in the top quartile at age 8 were much more likely than boys to stay there at age 10 for all the competencies other than Mathematics, the Burt Word Reading test, and reading age. Yet they also showed more volatility than boys: they also had a higher proportion of those who lost ground between ages 8 and 10. Girls were more likely than boys to move from the top quartile at age 8 to the bottom quartile at age 10 for the social and attitudinal competencies and writing. This is a different pattern from progress between ages 5 and 10, suggesting that between ages 8 and 10, something is happening differently for girls than for boys.

The only competency where there were no gender differences in patterns of progress was Fine Motor Skills.

Table 21

Retention and Movement Across Quartiles Ages 8–10 for each Gender

Departures → Competency ↓		Departures for quartile 1 retention	Departures for quartile 4 retention	Departures for movement from quartile 1 to quartile 4	Departures for movement from quartile 4 to quartile 1
Perseverance	*Girls →*	10.4	29.4	-12.8	-21.5
	Boys →	29.6	19.5	-15.7	
Individual Responsibility	*Girls →*		27.0	-12.0	-25.8
	Boys →	32.8		-17.0	
Social Skills with Peers	*Girls →*	13.1	22.8	-14.7	-24.2
	Boys →	25.3	13.3	-12.9	-15.5
Social Skills with Adults	*Girls →*			-10.6	-15.4
	Boys →	23.3	11.6	11.2	
Communication	*Girls →*	21.1			-19.7
	Boys →	24.3		-17.5	-14.0
Mathematics	*Girls →*	50.8	30.6	-20.8	-23.9
	Boys →	39.2	38.4	-21.5	-23.2
PAT Reading Comprehension	*Girls →*	36.0	44.5	-21.9	-22.3
	Boys →	37.0	41.8	-21.8	-24.8
Burt Word Reading	*Girls →*	55.5	48.2	-23.0	-25.9
	Boys →	47.0	57.4	-21.8	-25.9
Writing	*Girls →*	13.0	17.1		-14.6
	Boys →	23.0	13.7	-20.1	
Reading Age	*Girls →*	33.2f	32.1	-13.6	-26.2
	Boys →	44.0	37.1	-19.8	-24.1
Logical Problem-Solving	*Girls →*	34.6	34.6	-17.9	-23.6
	Boys →	37.4	29.8	-18.2	-22.0

This is a more complex picture of gender differences than we can obtain by looking at average scores only, or taking cross-sections of separate classes. Girls do not make better progress than boys between ages 8 and 10. There are some consistencies for children whose prior performance was in the bottom and top quartiles, but also some differences. One can hypothesise that traditional assumptions about gender still hold sway, which might account for the differences in Mathematics (favouring boys), and writing (favouring girls).

But why should girls who score poorly on the Burt Word Reading test at age 8 be more likely than boys who also scored poorly on it to continue to do so at age 10? Why do more girls than boys who were scoring highly at age 8 lose ground at age 10 on this measure? Perhaps it is linked to the higher proportion of girls whose previously high scores for the social and attitudinal competencies dropped at age 10. But then the puzzle is why this greater volatility should affect only the Burt Word Reading test, and writing – and not the PAT Reading Comprehension test, or Mathematics. It will be of great interest to see whether these patterns continue at age 12.

Progress in Relation to the Median

To get a broader picture of gender and progress over time, we did an analysis of movement from the bottom and top quartiles at ages 5 and 8 in relation to the median at age 10.

Over the first five years of school, girls whose scores were in the lowest quartile for the social and attitudinal competencies at age 5 were much more likely than boys to move above the median score by age 10, other than for Curiosity. They were also more likely to move above the median for reading age, and for Logical Problem-Solving. Boys were three times more likely than girls to move from the lowest quartile above the median for the Burt Word Reading test, and also more likely to show upward progress on the PAT Reading Comprehension test.

Boys also made greater progress than girls from the bottom quartile at age 8 to above the median at age 10 for the Burt Word Reading test and for Curiosity. Girls were more likely to move upwards between these ages for the social and attitudinal competencies, other than Communication, as well as for writing, reading age, and Logical Problem-Solving.

When we look at the proportions of the top quartile whose scores keep them above the median at age 10, we find that girls are more likely to stay above the median than boys for every competency measure except Curiosity and the Burt Word Reading test. But between ages 8 and 10, there was no difference between boys and girls for the Burt Word Reading test, for the PAT Reading Comprehension test, or for Mathematics.

Thus there are different patterns related to original performance level, just before the children started school, and to different aspects of literacy. Girls who start low are less likely than boys to move upwards for some literacy measures. However, they move similarly to boys for Mathematics, and move much more than boys on the social and attitudinal measures.

Table 22

Gender and Movement from Bottom Quartile Above Median

Competency	% Quartile 1 age 5 → above median age 10		% Quartile 1 age 8 → above median age 10	
	Girls	Boys	Girls	Boys
Curiosity	35	38	28	35
Perseverance	25	19	18	11
Individual Responsibility	53	23	25	15
Social Skills with Peers	58	30	38	23
Social Skills with Adults	43	26	34	25
Communication	57	13	28	26
Mathematics	14	17	6	6
Fine Motor Skills	41	35	39	36
PAT Reading Comprehension	14	20	12	5
Burt Word Reading	10	36	2	7
Writing	30	26	32	17
Reading age	30	17	18	6
Logical Problem-Solving	49	20	16	11

Table 23

Gender and Retention of Top Quartile Above the Median

Competency	% Quartile 4 age 5 → above median age 10		% Quartile 4 age 8 → above median age 10	
	Girls	Boys	Girls	Boys
Curiosity	39	39	56	62
Perseverance	60	39	65	57
Individual Responsibility	53	41	79	47
Social Skills with Peers	68	57	76	65
Social Skills with Adults	64	43	66	61
Communication	77	52	72	58
Mathematics	91	75	87	84
Fine Motor Skills	64	50	69	57
PAT Reading Comprehension	76	67	93	92
Burt Word Reading	70	73	98	100
Writing	64	57	72	53
Reading age	82	57	82	75
Logical Problem-Solving	74	68	95	87

Ethnicity

One recent analysis of some of the main social policy 'gaps' between Maori and non-Maori has shown that differences in income and educational levels can account for much of the differences favouring non-Maori (Chapple, 2000[29]).

Crooks and Caygill (1999), comparing Maori and non-Maori students' performance on the NEMP tasks at Year 4 (age 8) and Year 8 (age 12), found that the apparent differences, particularly evident in literacy, mathematics, and information skills, were somewhat reduced when they compared student populations in schools with 10 to 30 percent Maori enrolment, in order to reduce the confounding of ethnicity and socio-economic factors. This resulted in an overall Maori student median percentile of 44 in these schools, 'indicating quite a small average gap in performance between Maori students and other students' (p. 12).

Previous reports from the Competent Children project have noted that where differences between children with different ethnicity were found, they were largely accounted for by family income differences. This was less true, however, at age 8 than at ages 5 and 6.

At age 10, there are no gaps related to ethnicity for most of the social and attitudinal competencies in the Competent Children project sample. The evident gaps are in Mathematics and Literacy, with the exception of writing. Focusing on the average score masks the spread of achievement to some degree: 27 percent of the Maori children and 15 percent of the Pacific children scored above the median score for Pakeha/European and Asian children.

Table 24

Ethnicity and Children's Competencies at Age 10

Ethnicity→ Age 10 Competency↓	Pakeha/ European *mean* n=400	Maori *mean* n=52	Pacific Island *mean* N=27	Asian *mean* n=15	Probability of F-value from anova	Percent variance Accounted for
Communication*	**71.8**	68.9	61.4	68.1	0.013	2.2
Mathematics	65.4	52.1	44.4	**66.0**	**0.0000001**	**6.9**
Literacy —PAT Reading Comprehension	**50.7^^^**	41.8^^^	34.8	48.8^	**0.0002**	**4.0**
Literacy —Burt Word Reading	65.4	58.0	61.8	**66.8**	0.024	1.9
Literacy —reading age	**11yr6mth**	10yr4mth	10yr9mth	11yr1mth	**0.0002**	**3.8**
Logical Problem-Solving*	62.2	56.2	54.7	**64.3**	**0.001**	**3.3**
Composite Competency*	69.5^^^	67.5^^^	61.9	**70.2^**	**0.003**	**2.8**
Composite Cognitive Competency*	**64.5^^^**	58.2^^^	54.0	**64.5^**	**0.00003**	**4.7**

* In these cases the squared model was a better fit. ^ one fewer in this mean, ^^ two fewer in this mean, ^^^ three fewer in this mean, etc. The highest scores for each competency are in **bold** type.

After taking family income into account, we found that the differences in average scores shown above remained for Mathematics and Logical Problem-Solving. For the PAT Reading Comprehension measure, the differences remained significant only between

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[29] Chapple provides a very useful overview of the overlapping relation between socio-economic factors and ethnicity in New Zealand, as well as data showing socio-economic diversity among Maori. It is unfortunate that this analysis was accompanied by a rather narrow appreciation of the nature of identification as Maori.

Pakeha/European and Pacific children. For the Burt Word Reading test and for reading age, the differences remained significant only between Pakeha/European and Maori children. Family income reduced the size of the differences where they remained.

After taking maternal qualification into account, we found that differences remained for Mathematics; for the PAT Reading Comprehension test, between Pakeha/European and Pacific children; and for reading age, between Pakeha/European and Maori children. Again, including maternal qualification in the model reduced the size of these differences.

Thus on the whole, Maori and Pacific children in the Competent Children project sample are not under-performing on most of the tests given. Where they are, family income and maternal qualifications are playing a large part.

Ethnicity and Children's Progress

The number of children in the full study at age 5 allows a comparison of Pakeha/European and Maori children's progress from age 5 to age 10, but no comparison for children of Pacific or other ethnic origins. The comparison uses medians rather than quartile groups, which would need a larger number of Maori children.

Our previous analysis at age 8 showed that Maori children in the Competent Children project were more likely to stay below the median between ages 5 and 8. But there was no clear, consistent pattern across these three years. While Maori children who started above the median at age 5 were more likely to remain above it at age 6 for Mathematics and Logical Problem-Solving, they did not continue to do so between ages 6 and 8.

Between ages 5 and 10, Maori children whose scores were below the median at age 5 were twice as likely as their Pakeha/European peers to remain below the median at age 10 for Mathematics and Logical Problem-Solving.

If Maori children started above the median at age 5, they were less likely than their Pakeha/European peers to remain there for Perseverance, Curiosity, Social Skills with Adults, Mathematics, PAT Reading Comprehension, Burt Word Reading, writing, reading age, and Logical Problem-Solving.

Between ages 8 and 10, this pattern continued, with a few notable exceptions. Retention rates above the median were similar for Burt Word Reading. Maori children who were above the median at age 8 were much more likely than their Pakeha/European peers to remain there at age 10 for:

- Writing (a departure[30] of 35 percent of the Maori children compared with 10 percent of the Pakeha/European children, more than the expected percentage);
- Perseverance (a departure of 28 percent of the Maori children compared with 16 percent of the Pakeha/European children, more than the expected percentage).

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[30] The departure is the difference between what we find in our sample, and what would happen by chance. We compute the actual percentage of children one would expect to find in each group (here below and above the median) for our sample, and then compare that with the percentage actually found. For our sample size, a difference of around 22 percent for Maori children, and 8 percent for Pakeha/European children (of whom we have many more), suggests that this difference is significant.

But they were less likely to maintain their level of performance for Curiosity, Social Skills with Peers, Social Skills with Adults, Communication, Mathematics, PAT Reading Comprehension, reading age, and Logical Problem-Solving.

Maori children whose scores at age 8 were below the median were more likely than their Pakeha/European peers to remain below the median at age 10 for these competencies:

- Mathematics (a departure of 33 percent of the Maori children compared with 24 percent of the Pakeha/European children);
- PAT Reading Comprehension (a departure of 33 percent of the Maori children compared with 23 percent of the Pakeha/European children);
- Burt Word Reading (a departure of 38 percent of the Maori children compared with 32 percent of the Pakeha/European children);
- Reading age (a departure of 27 percent of the Maori children compared with 23 percent of the Pakeha/European children).

Thus, although both groups showed consistent performance between ages 8 and 10 for many of the competencies, Maori children were somewhat more likely to remain below the median for the key cognitive areas of mathematics and reading. This meant that Maori children were over-represented in the lowest quartile of performance. Maori children are 11.5 percent of the Competent Children project sample, but 20 percent of the bottom quartile at age 10 for Mathematics, 18.1 percent for Burt Word Reading, 17.7 percent for reading age, and 17.4 percent for Logical Problem-Solving.

While Maori children who did well in writing and perseverance at age 8 continued to do well at age 10, their performance in other aspects of school work was less consistent. This meant that Maori children were under-represented in the top quartile at age 10 for Mathematics (2.8 percent), reading age (1.1 percent), PAT Reading Comprehension (4.8 percent), and Communication (5.3 percent).

Ethnicity and Children's Experiences

Ethnicity did not play a notable part in the patterns of the lives of the children in the Competent Children project, at least in terms of the aspects we asked about. It is possible that some trends which were not statistically significant would become more noticeable with larger samples of non-Pakeha/European groups, which contained a wider spread of incomes, than we have in the Competent Children project, and with material that was more specific to particular cultural activities and relationships.

Our sample contains similar proportions of, for example, Maori and Pakeha/European in both the top and bottom income groups, though there were differences related to maternal employment, with Maori and Pacific mothers more likely to have no paid work: Maori mothers were less likely to be employed full-time (22 percent, compared with 31 percent of employed mothers overall), and more likely to be in unskilled work (38 percent of Maori mothers employed, compared with 19 percent overall), with fewer in professional or semi-professional work (18 percent, compared with 29 percent of employed mothers overall).

Maori and Asian families were the most likely to be paying half or more of their income on housing (30 percent and 28 percent, compared with 16 percent of Pakeha/European, and 19 percent of Pacific families).

In relation to maternal qualification levels, the ethnic differences in our sample occur at either end: Pakeha/European mothers were the least likely to have no qualifications, and Maori and Pacific mothers were the least likely to have university qualifications (Table 25).

Table 25

Maternal Qualifications and Ethnicity

Ethnicity → Qualification ↓	Pakeha/European %	Maori %	Pacific %	Asian %
None	12	26	21	17
Mid-senior school	51	54	64	39
Tertiary	16	17	14	11
University	21	4	0	33

Maori parents had the clearest aspirations for their child to undertake tertiary study (71 percent, compared with 53 percent overall).

Maori children were less likely to report reading as one of the three things they spent most time doing outside school (12 percent, compared with 23 percent overall). Maori and Pacific parents were more likely to say they did not enjoy reading themselves, or read only if they had time (20 and 18 percent, compared with 9 percent for Pakeha/European and Asian parents). Pacific parents were most likely to report work or study-related reading (27 percent, compared with 6 percent overall), and more likely to report spare-time interests related to their work (14 percent, compared with 3 percent overall).

Yet the Maori children in the study were just as likely to enjoy reading, and to use the public library, as others.

Preferences for homework were much the same for children from different ethnic groups, but Maori children were most likely to enjoy homework that involved art, creativity, or music (34 percent, compared with 19 percent overall). When they talked to their parents about school, they were just as likely as others to mention school work, but 42 percent also talked about their play at school, compared with 28 percent overall. If Maori children were bullied, it was more likely to be physical (63 percent, compared with 37 percent of those bullied overall) than verbal (42 percent, compared with 74 percent of those bullied overall).

Maori and Asian children were more likely to report adult/family entertainment television programmes as among their three favourite television programmes, (18 percent, compared with 9 percent overall).

Maori and Asian parents were less likely to have grandparents or other relatives available to care for children during school holidays or when they were ill (12 percent and 17 percent, compared with 31 percent overall). This may be related to whether parents and grandparents live within easy distance of one another. Certainly Maori children in the study were most likely to describe their home as a place *where our relatives come always* (36 percent, compared with 22 percent overall).

Asian parents reported a higher use by their children of computers to play games (67 percent, compared with 36 percent overall), and to send e-mail (17 percent, compared with 3 percent overall). The children themselves reported higher uses of the computer for homework or projects (50 percent), and a slightly higher use of educational games (28 percent). Thirty-nine percent of their parents thought spelling was the homework that was of most value (compared with 17 percent overall). None reported their children writing long stories compared with 20 percent overall; and the children were most likely to nominate homework which involved creative writing as their least preferred (22 percent, compared with 7 percent overall, in response to an open-ended question). Asian children were more likely than other groups to respond to a maths problem by persisting (61 percent, compared with 34 percent overall).

There were some different patterns of school attendance, with Pakeha/European and Asian children more likely than other groups to attend decile 9–10 schools, or private schools. Pacific students were the group most likely to attend integrated (usually church-affiliated) schools.

Table 26

Ethnicity and School Characteristics

Family income → School characteristics ↓	Pakeha/ European (n=388) %	Maori (n=50) %	Pacific Island (n=26) %	Asian (n=15) %	Sample (n=507) %
State	79	90	54	67	78
Integrated	14	8	42	27	16
Private	7	2	4	7	7
Decile 1–2	7	24	42	7	11
Decile 3–4	13	18	12	20	13
Decile 5–6	9	16	0	0	9
Decile 7–8	20	14	5	20	19
Decile 9–10	51	28	27	53	48
<8% Maori on roll	51	22	44	53	47
8–14% Maori on roll	18	16	20	7	18
15–29% Maori on roll	21	30	12	13	21
30%+ Maori on roll	11	32	24	27	15
Contributing	49	65	35	53	50
Full (incl F1–2)	46	33	65	40	46
Composite	5	2	0	7	4

There were no other school-related differences. The Maori children in our study were just as likely as the Pakeha/European children to feel positive about school. Nash and Harker (1994) also found no ethnic differences among their secondary school sample in the *Progress at School* study, in terms of students' feelings about school.

First Language

In previous phases of the research, we found that some gaps grew over time between children whose first language was not English, and those whose first language was English, though the associations were diluted when family income was taken into account.

At age 10, the gaps are no longer there for most of the social skills and attitudes, with the exception of Social Skills with Adults and Communication. The gaps remain for Literacy, Mathematics, and Logical Problem-Solving, even after taking family income into account.

However, there is an interesting interaction with family income levels. At age 10, there are higher scores for low income children whose English is a second language, compared with low income children whose English is their first language, for Social Skills with Adults, Perseverance, and Individual Responsibility. The gaps remain in relation to English as a Second Language for children whose families have middle or high family incomes.

After including maternal qualification in the model, the gaps remain, somewhat reduced, for Social Skills with Adults, Communication, Mathematics, and Literacy, but not for Logical Problem-Solving.

Table 27

First Language at Age 5 and Children's Competencies at Age 10

Age 5 First Language → Age 10 Competency↓	English *mean* n=486	not English *mean* n=20	Probability of F-value from anova	Percent variance Accounted for
Social Skills with Adults*	75.5	65.9	0.023	1.0
Communication*	71.4	60.4	**0.004**	1.6
Mathematics	63.7	46.0	**0.0006**	2.3
Literacy—PAT Reading Comprehension	49.7^^^^^^	32.8	**0.0005**	2.4
Literacy —Burt Word Reading	65.0	56.9	0.041	0.8
Literacy —writing*	71.4^	63.8	**0.009**	1.4
Literacy —reading age	11yr4mth	10yr2mth	**0.005**	1.6
Logical Problem-Solving*	61.5	55.4	0.049	0.8
Composite Competency*	69.2^^^^^^^^	62.1	**0.005**	1.6
Composite Cognitive Competency*	63.9^^^^^^^^	52.5	**0.0002**	2.7

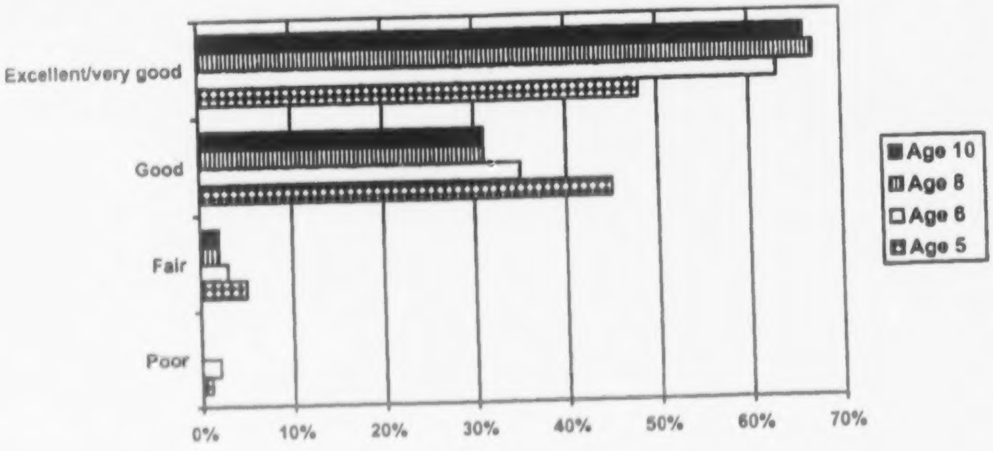
* In these cases the squared model was a better fit. ^ one fewer in this mean, ^^ two fewer in this mean, ^^^ three fewer in this mean, etc . The highest scores for each competency are in **bold type**.

Health

The study children's health status, which showed overall improvement from ages 5 and 6 to age 8, appears to have reached a plateau at age 10.

Figure 3

Parents' Perceptions of Their Child's General Health



Boys' health was less likely than girls' health to be rated as excellent/very good by parents (62 percent, compared with 71 percent).

The main health problems mentioned by those who described their children's health as being other than excellent were chronic illness, chronic allergies, and ear infections. The increase in the number reporting allergies is significant. However, there was also a significant drop in the number of parents reporting ear infections at age 10, compared with age 8. Fewer parents were reporting children's having to put up with chronic illness than at age 8. These movements are likely to have been reflected in parental perceptions of relatively little change in the study children's overall health between ages 8 and 10. Although we have not isolated this category before, a small number of children were reported to be receiving treatment or counselling for emotional disorders. Table 28 compares the children's main health problems, as reported by parents, at ages 5, 6, 8, and 10. Twenty-three percent of parents of the children at age 10 reported one health problem, 8 percent reported two health problems, and 3 percent reported 3–5 health problems for their child.

Table 28

Parents' Reports of Children's Health Problems

Parent Report → **Ailment ↓**	**At age 5 (n=148) %**	**At age 6 (n=106) %**	**At age 8 (n=172) %**	**At age 10 (n=170) %**
Chronic illness	35	36	45	40
Chronic allergies	20	10	8	15
Ear	31	23	22	12
Frequent colds	25	21	10	12
Effects of illness/injury/accident	1	-	10	8
Growth problems	-*	-	8	8
Eyes	-	2	5	8
On medication	12	7	10	7
Listless/tired	4	10	5	6
Seeing specialist	-*	-	5	6
Mental/emotional disorders				6
Takes a long time to recover/recuperate	4	3	3	3
Catches everything going	7	6	3	1

n = number of parents who said their child had a health problem. Children could have more than one health problem reported.

* We asked these as separate questions at age 5.

Our data on children's health are limited to these questions and information from the original 5-year-old sample, again from parents, about the child's hearing and vision. Our analysis is also limited because there are very few children in the sample whose health is reported as less than good at age 10: 66 percent of the children were reported to be in excellent health, 31 percent in good health, and only 2 percent in poor to fair health.

We found few associations with overall health status until age 8, when some largely indicative associations were found for Perseverance, Individual Responsibility, Mathematics, Logical Problem-Solving, and the Literacy measures other than the Burt Word Reading test. At age 10, only Perseverance showed an association, and this was not as expected. Children whose health was rated poor to fair scored as highly on average as those whose health was excellent. Perhaps, however, this result makes some sense when one thinks of the additional effort required of those in continuous poor health. The gap found was between those in excellent health, and those whose health was reported as good. This remained after taking family income and maternal qualification separately into account.

Children who were having their hearing monitored at age 5 had lower average scores at age 10 than other children for Mathematics, Individual Responsibility, and Logical Problem-Solving. The difference was at the indicative level. There were no differences relating to children who had had a hearing problem corrected by age 5. Including family income and maternal qualification separately weakened these associations, particularly for Mathematics, suggesting that hearing status at age 5 was related to these two prime family resources.

Summary

Children's gender and health has both biological and social dimensions, whereas their ethnicity and first language has mainly social dimensions. Socio-economic factors make more inroads into apparent differences between children's achievement related to ethnicity and first language than they do to those related to gender and health. However, the social dimensions associated with gender may lie behind some of the patterns we found, in terms of what is supported, tolerated, and seen, both at home and school.

Although there is currently a great deal of popular interest in the achievement of boys relative to that of girls, the results from the Competent Children project are consistent with those of other analyses. While there are gaps, the size of those gaps is not large—and as we shall see, it pales in comparison with gaps related to family resources. While some boys' behaviour in classrooms may be more demanding for teachers than most girls' behaviour, it does not seem to prevent boys from performing equally well on measures of cognitive achievement, or from making the same or better progress. Boys' levels of communication and social skills may warrant more concern, but that may require renewed attention to some of the traditional values attached to masculinity and femininity. The data also show that girls who were in the bottom quartile at age 5 were more likely than boys to remain there at age 10 for Mathematics and the Burt Word Reading test, and that between ages 8 and 10 there was more volatility for girls who had been in the top quartile at age 8 than for boys.

It is of concern that Maori and Pacific children in the study had much lower scores than others for Mathematics, after allowing for differences in family income and maternal qualification levels. While most of their lower literacy scores could be accounted for by these socio-economic differences, Pacific children were still scoring lower for reading comprehension, and Maori children for reading age, than Pakeha/European children. If ethnicity was a factor in teacher estimates, one might have expected Pacific children also to score lower for reading age, but this was not the case. Nor were there any ethnicity differences apparent in the social and attitudinal competencies, which were teacher-rated. Teachers' views of children's curriculum and non-curriculum strengths and weaknesses (see Chapter 13) also show no ethnicity differences.[31] There are few ethnicity differences apparent in the material we gathered on children's out-of-school activities, though Maori children were less likely to mention reading as one of their main activities.

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[31] Chapple (1997, p. 95) summarises findings from the three then available empirical studies, undertaken before 1991, showing no relation between teacher expectations (or attitudes) and Maori student achievement.

It appears that the apparent ethnicity differences may be located in children's knowledge base prior to coming to school, rather than in teacher attitudes, or in children's lack of engagement in or enjoyment of school activities (though our data on children's views of their experience is restricted to age 10, and does not cover earlier experiences). Maori children do have lower early childhood education attendance rates than others, and early childhood education attendance appears to be particularly useful for mathematics development.

Having English as a first language does make it easier for children to progress through New Zealand's largely monolingual mainstream education system. Those who do not have English as their first language scored much lower for Mathematics, and lower for the literacy and Communication measures, in particular. Further work would be needed to show whether these differences reflect language or knowledge barriers (or both), and differences in first language knowledge and daily use. But among children from low income homes, we found higher scores for Perseverance, Social Skills with Adults, and Individual Responsibility for the children from immigrant families than for New Zealanders.

Our sample may not be representative of such children, and caution is needed because of the small numbers involved. The forthcoming Longitudinal Immigration Survey should provide much needed data on and better understanding of our increasingly more diverse population.

Other longitudinal studies of children's progress have been more health-focused than ours, and have been able to include batteries of medical tests. Perhaps if we had more detailed health data, we would be able to show more associations between children's health and their competencies. As it is, the Competent Children project children are largely healthy, and socio-economic differences appear to underlie the apparent difference relating to earlier hearing problems.

6 EARLY CHILDHOOD EDUCATION EXPERIENCE

In this chapter we analyse the associations between the study children's competency levels and their early childhood education experience. This experience was described in some detail in the report *Competent Children at 5—Families and Early Education*.[32]

Early childhood education (ECE) continued to show positive associations for children's competency levels at age 8, three years after they had moved on to school. Indeed, our earlier reports showed some of these associations *gaining* strength as the children grew older, rather than waning.

At age 8, ECE experience was most strongly related to Mathematics and the PAT Reading Comprehension scores. It made modest contributions to Communication, Social Skills with Peers, and Curiosity, and moderate contributions to Perseverance, Social Skills with Adults, and Logical Problem-Solving.

The particular aspects of ECE which were linked to children's competency levels were some quality factors, the age at which a child started ECE, and linked to this, the total amount of their early childhood education experience, as well as the socio-economic mix of the ECE centre they last attended.

The quality factors which we analyse are mainly related to *process*, or what happens in the ECE centre, and the learning opportunities made available to children in the centre. At age 5, we found that quality scores were related to the prior training of the staff, salary level, the child:staff ratio, and group size. This is largely consistent with the overseas research literature (Smith et al, 2000).

However, we also found that, in New Zealand, each type of ECE had distinct configurations of these four main ingredients of quality. Often, high standards in one structural variable identified in the overseas literature as associated with good quality appeared with another identified as low quality. For example, kindergarten staff were all fully qualified, and tended to have higher salaries; but they worked with the highest child: staff ratio and largest group size. Family day care had very low group sizes and child:staff ratios, but few staff with any ECE training. This makes it highly problematic to try to analyse these structural factors separately at age 10 in relation to children's competency levels, and we have therefore not done so. To do so, we would need much larger numbers of children in each ECE type than we have.

Analysis of ECE Experience Factors

Early Childhood Education Starting Age[33]

The advantages to children of starting to attend early childhood education before the age of 2 increased from age 5 to age 8. At age 8, these children tended to score higher for Curiosity, Logical Problem-Solving, Communication, literacy, and Mathematics. At age 10, some of these advantages were no longer apparent, though the same pattern persisted of an advantage to children who had started ECE before they were aged 2.

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[32] Wylie, C., Thompson, J., & Kerslake Hendricks, A. (1997). Wellington: New Zealand Council for Educational Research.

[33] This analysis was done for all 505 children in the study at age 10.

Table 29

Starting Age at ECE and Children's Competencies at Age 10

Starting Age at ECE → Competency↓	1 Starting Age <12 months *mean* n=145	2 Starting Age 12-23 mos. *mean* n=83	3 Starting Age 24-35 mos. *mean* n=114	4 Starting Age ≥36 months *mean* n=165	**Probability of F-value from anova**	Percent variance acct. for
Mathematics	65.0	**66.9**	62.6	59.5	0.054	
Literacy —PAT Reading Comprehension	51.0^^	**54.2**	47.2^^	45.9^^	0.016	
Literacy —reading age	11yr8mth	**11yr10mth**	11yr2mth	11yrs	**0.00024**	3.8%
Logical Problem-Solving*	63.3	**63.7**	59.9	59.3	**0.0068**	2.4%
Composite Cognitive Competency*	64.7^^	**66.2**	62.5^^	61.5^^^	0.032	

* In these cases the squared model was a better fit. ^^ two fewer in this mean, ^^^ three fewer in this mean, etc.

ECE starting age continued to have a bearing on children's competency scores after taking family income at age 10 into account for the literacy measures, and for Logical Problem-Solving, but not for Mathematics. Reading age was the only competency measure which remained associated with children's ECE starting age, once maternal qualification was taken into account.

Length of ECE Experience

Children who started ECE at the same age did not all have the same length of ECE experience. Some children had no breaks in their ECE experience; others had intervals of no ECE. Length of ECE experience showed more associations at ages 6 and 8 than when children were near age 5, or when they were aged 10.

At age 8, there were associations with Mathematics, Communication, Logical Problem-Solving and Fine Motor Skills, after taking family income into account. Children from low income homes with more than 2 years' ECE experience closed the gap between themselves and high income children for Communication, and with more than 4 years' experience, for literacy. Maternal qualification and length of ECE experience made contributions of similar strength to children's Communication scores, and length of ECE experience made a stronger contribution for Mathematics and Logical Problem-Solving.

At age 10, children with more than 4 years ECE experience tended to score more highly on some competencies, though there were no significant differences between them and those children who had 3–4 years' ECE experience.

Table 30

Length of Experience at ECE and Children's Competencies at Age 10

Length of experience at ECE → Competency↓	1 <24 months *mean* n=35	2 24-35 months *mean* n=56	3 36-47 months *mean* n=71	4 ≥48 months *mean* n=112	Probability of F-value from Anova	Percent variance acct. for
Communication*	66.4	66.3	**73.6**	71.6	0.029	3.4%
Mathematics	58.3	58.1	61.8	**67.3**	0.038	3.1%
Literacy — Reading Age	11yr1mth	10yr9mth	11yr6mth	**11yr8mth**	0.029	3.3%
Logical Problem-Solving*	57.5	57.7	61.4	**64.6**	**0.0018**	5.4%
Composite Competency*	65.8^^	65.8^	69.5	**70.4^^**	0.031	3.3%
Composite Cognitive Competency*	60.6^^	60.4^	62.9	**66.1^^**	0.032	3.3%

* In these cases the squared model was a better fit. ^ one fewer in this mean, ^^ two fewer in this mean.

After taking family income into account, the associations in the table above remained, though diluted. However, the additional advantage of longer ECE experience for low income children seen at age 8 had not persisted. After taking maternal qualification into account, the associations also remained, again diluted.

Fergusson, Horwood, & Lynskey (1994) found continued associations up to age 13 between ECE duration and school achievement and cognitive ability in the Christchurch longitudinal study, favouring children with more than 3 years' ECE experience. Three years' ECE experience also emerges as a threshold in a Swedish study (Broberg et al, 1997). The US research is more mixed on the long term impact of duration of ECE attendance, particularly for low income children, with some US studies finding 'fade-out' effects in the first few years of school, and others finding continued impact, linked to the quality of the ECE programme, or high quality school following high quality ECE experience (Currie, 2000; Smith et al, 2000, p. 30–37). Elsewhere, the pattern of associations appears to vary with time and other experiences which may overlay it. A longitudinal Swedish study found no positive associations with cognitive performance and social skills for boys at age 8, but did find them at age 13 (Andersson, 1993).

Patterns of ECE Experience[34]

Does it matter how many ECE services a child has attended, or whether they attend two concurrently, such as kindergarten and family day care? In the Competent Children sample, 38 percent of the study children attended only one ECE, 30 percent went to two or more, one after the other, and 32 percent had gone to two or more at the same time for at least part of their ECE experience.

At age 5, these differences in patterns did not show any associations with children's competencies. At age 6, children who combined ECEs did better than others for Logical Problem-Solving, while children who attended only one ECE did best on Perseverance. These effects were weakened by taking family income into account. At age 8, children who had combined ECEs continued to score higher on Logical Problem-Solving, by 4 percentage points. However, taking family income into account removed this association.

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[34] The analysis includes all 505 children in the study.

At age 10, we continue to see the relationship with Perseverance that emerged first at age 6, with children who attended only one ECE centre scoring 5 percentage points more than those who attended two or more ECE centres in sequence, but not significantly more than those who attended two or more ECE centres concurrently.

We see a new relationship with Individual Responsibility, with the same pattern as Perseverance, namely a 6 percentage points difference for those who attended only one ECE centre over those who attended two or more ECE centres in sequence, but not concurrently. Those who attended only one ECE centre scored 3 percentage points higher than others for Fine Motor Skills. These associations remained after we allowed, separately, for family income and maternal qualification.

It may be that these differences reflect the kinds of ECE centres and the quality of those centres, as much as the fact of combining ECE experience. Unfortunately, we do not have the detailed information required about all the ECE centres attended by children to be able to explore this finding further.

Final ECE Type

We noted above that New Zealand early childhood education centres have different combinations of structural quality characteristics, often combining good quality features with less supportive ones.

At age 5, children attending A'oga Amata (Samoan immersion ECE) tended to score lower than others, but not when we took into account whether or not a child had English as their second language. There was no sign of this difference at age 6, but at age 8 it had emerged again, and was particularly noticeable for Mathematics, PAT Reading Comprehension, and Logical Problem-Solving.

At age 10, the associations with Mathematics and PAT Reading Comprehension remained, but at an indicative level. Children who had attended A'oga Amata showed lower scores, with larger gaps than in previous years. These remained after accounting for family income, but faded after taking English as a second language and maternal qualification into account, indicating that any differences evident are more likely to be due to these two factors than to ECE type.

In addition, after taking family income into account, children who had attended kindergartens showed a tendency to have lower scores for Mathematics than those who had attended playcentres (5.5 percentage points, s.e.=2.6). However, this difference was not evident after taking maternal qualification into account.

Parental Views and Involvement

Good communication between parents and ECE staff is important for parents (Smith et al, 2000). When the study children were attending their final ECE, we asked parents about their communication with ECE staff, and used one of the questions as an indicator of good communication: whether they felt they had enough opportunity to talk about their child with ECE centre staff. This has some drawbacks as an indicator, because some parents felt their opportunities were limited by their own lack of time, rather than by the availability of ECE staff. However, there are no associations with competency scores for this indicator of parental comfort with their child's final ECE centre, either at age 10, or at earlier ages.

We also looked for any associations between children's competency levels and whether parents felt their child's attendance at the ECE had had any negative effects for their child. As at earlier ages, at age 10 there were no associations between these views and children's competency scores. The level of parental involvement in the ECE centre (based on the kinds of involvement reported by parents, looking separately at voluntary help in the classroom, and other voluntary help) has also shown no associations with competency scores throughout the study.

These findings are consistent with other research. Qualitative studies indicate the importance of parent views to parent comfort. However, quantitative analyses show little relation between parental satisfaction with the quality of their child's ECE, and indicators of quality which other research has found to be linked positively to benefits for children (e.g. Barraclough & Smith, 1996; Cryer & Burchinal, 1997). There are few studies on the relation of parental involvement in ECE to children's competencies. Podmore (1993) provides an overview of overseas research, with mixed findings.

ECE Socio-economic Mix

Few studies of the impact of early childhood education experience have included the socio-economic mix of the children served by individual centres in their analysis. We included it because of the research literature indicating that socio-economic mix has a bearing on the resources available to schools, and in a number of studies appears to have a bearing on student outcomes.[35]

At age 5, children whose final ECE centre served mainly low income children scored lower than others; at ages 6 and 8, the gap was between children whose final ECE centre served a mainly middle class group and others.[36] The competencies which were consistently associated with the socio-economic mix of the children's final ECE centre were Mathematics, Logical Problem-Solving, and literacy. At age 10, these associations with 'cognitive' competencies continued to be evident, with some indicative associations with three other competencies emerging.

Children whose final ECE had served mainly middle class families had higher scores on average for the cognitive competencies, as in earlier school phases. However, children whose final ECE had served mainly low income families also stood out. They were the group which had lower scores on average for Perseverance, Social Skills with Adults and Communication.

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[35] Many quantitative studies which include family income find an effect for school socio-economic mix over and above family income; however, some studies do not, or find only small effects. There is continuing debate about why this is so: whether it is a question of which statistical methods are used, the significance of data on prior achievement, and the use of pooled family income or individual family income; whether evident effects reflect other underlying factors (depending on how socio-economic mix is thought to be manifest, and at what level of schooling); and whether some of the patterns which are evident in qualitative research are too elusive for statistical analysis (see Nash & Harker, 1998; Nebycha et al, 2000; Thrupp, 1999; Wilkinson et al, 2000; Wylie, 1998).

[36] We categorised ECE teachers' descriptions of the general socio-economic characteristics of the children using their centre using two income related categories, and two class related categories.

Table 31

ECE Socio-Economic Mix and Children's Competencies at Age 10

ECE Socio-Economic Mix → Competency↓	Wide mix *mean* n=81	Middle class *mean* n=109	Low to middle income *mean* n=51	Low income *mean* n=30	Probability of F-value from Anova	Percent variance acct. for
Perseverance	67.7	73.3	71.6	62.4	0.027	3.4
Social skills with Adults*	72.1	76.7	76.7	67.2	0.026	3.4
Communication*	68.5	72.4	73.9	61.8	0.006	4.6
Mathematics	54.4	72.4	61.5	52.2	0.00000001	13.9
Literacy —PAT Reading Comprehension	43.1^^	57.2	49.2^	32.2^	0.00000001	14.1
Literacy —Burt Word Reading	60.4	69.8	63.8	55.5	0.00006	7.9
Literacy —writing*	69.1	73.9^	71.0	65.1	0.008	4.4
Literacy —reading age	11yr1mth	12yr2mth	11yr2mth	10yr6mth	0.000008	9.4
Logical Problem-Solving*	59.8	65.5	59.5	54.4	0.0002	7.0
Composite Competency*	66.0^^	71.8^	69.3^	62.9^	0.00003	8.7
Composite Cognitive Competency*	59.1^^	68.9^	62.7^	55.5^	0.00000003	13.5
Composite Social & Attitudinal Competency*	66.9	71.2	70.9	63.2	0.010	4.1

* In these cases the squared model was a better fit. ^ one fewer in this mean, ^^ two fewer in this mean. Analysis done for 271 children from full study at age 5.

These patterns were diluted after taking (individual) family income and maternal qualification separately into account, but they still remained. What is interesting about this finding, in the light of the debate about the impact of socio-economic mix, is that it provides some new material about the persistence of its association, over a period of 5 years.

ECE Characteristics and Parental Experience Factors

Table 32 gives an overall picture of the associations between the characteristics of children's last ECE centre, parental perceptions of that ECE experience, and children's competencies at age 10. The characteristics of ECE centres show associations with children's competency levels, but there is little relation evident between parental views and involvement and children's competency levels.

If a diamond is marked for a particular competency, that indicates that there was an association found using one-factor modelling. An F indicates that the association remained after including family income in the model; an M, that it remained after including maternal qualification (separately). An i indicates an interaction effect, i.e. different patterns for different levels of income or maternal qualification (iF or iM)

Table 32

Summary Results of Modelling Using ECE Experience Factors

ECE factors	Curiosity	Perseverance	Individual Responsibility	Social Skills Peers	Social Skills Adults	Communication	Mathematics	Fine Motor Skills	PAT	Burt	Writing	Reading Age	Logical Problem-Solving	Composite	Cognitive Composite	Social Communication
Starting Age at ECE									♦F			♦ FM	♦F		♦	
Combinations of ECEs		♦M	♦ FM					♦ FM								
ECE type at near age 5							♦ FM		♦F						♦ FM	
Total duration of ECE			iF			♦ FM	♦ FM					♦ F iF M	♦ F	♦ FM	♦ F	
Socio-economic mix of ECE		♦ F			♦ FM	♦ FM	♦ FM iM		♦ FM	♦ FM	♦ FM	♦ FM	♦ FM	♦ FM	♦ FM	♦ FM
Parental satisfaction with ECE staff communication about child's experience in last ECE			iF	iF				♦ F iF								
Parental perception that the last ECE had some negative aspects for the child			iF	iF												iF
Level of parental involvement in the child's last ECE					iF				M							

Analysis of ECE Quality Factors

Research on the impact of early childhood education has increasingly focused on aspects of *process*. Teacher interactions with children have emerged as a key indicator of quality (Currie, 2000; Smith et al, 2000).

We rated the quality of the full study children's final ECE centre with a set of 21 items grouped in four sub-scales, focused mainly on process aspects of early childhood education provision. The items were mainly drawn from US research instruments rating developmentally appropriate practices for young children, with some items stemming from other work on quality aspects, with a New Zealand flavour.[37] Each centre was visited on at least three occasions by a project team fieldworker, and an average rating for each item across these visits has been used in the analysis.

Our analysis at age 5 focused only on the total score of the four sub-scales, and showed few associations with children's competency scores. At age 6, we used the four sub-scales for analysis, and found associations with the staff-child interaction sub-scale, and some indications for the programme/activity sub-scale, and the resources and safety sub-scale.

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[37] For further details, see Thompson, J., Kerslake Hendricks, A., & Wylie, C. (1997). *Children's competencies at age 5 in the context of family resources and early childhood education. Vol II, Appendices*. Wellington: New Zealand Council for Educational Research.

At age 8, we turned to individual items relating to quality. We found that items relating to the quality of interaction between ECE staff and children were positively associated with children's competency scores, as were the availability of resources.

The pattern is much the same at age 10. Aspects of the interaction between staff and children continue to be associated with competency levels; the visible emphasis on print also shows strongly. Where a particular item shows significant associations at age 10 with a particular competency, we have returned to the material from earlier years and re-analysed it by item (rather than sub-scale).

The associations are not all linear. Children's competency scores do not necessarily rise in line with the quality rating of their final ECE centre. More often, we find that the top or bottom quartile stands out.

ECE Staff were Responsive to Children

Mathematics and PAT Reading Comprehension test scores showed the strongest associations with this item, as Table 33 shows.

Table 33

ECE Staff were Responsive to Children and Children's Competencies at Age 10

ECE Staff were Responsive to Children→ Age 10 Competency↓	1st quartile *up to 3.5 mean* n=66	2nd quartile *3.5+ to 4 mean* n=95	3rd quartile *4+to 4.33 mean* n=48	4th quartile *4.33+ mean* n=65	Probability of F-value from anova	Percent variance accounted for
Mathematics	57.7	60.6	63.8	**70.8**	**0.005**	4.6
Literacy —PAT Reading Comprehension	43.2	46.4^^	54.0^	**55.0^**	**0.004**	4.9
Literacy —Burt Word Reading	60.1	63.4	66.1	**68.3**	0.054	2.8
Literacy —writing*	68.4	70.6^	70.9	**74.3**	0.026	3.4
Composite Competency*	66.6	67.2^^^	69.3^	**72.5^**	**0.006**	4.6
Composite Cognitive Competency*	59.4	62.0^^^	65.0^	**68.5^**	**0.0008**	6.1

* In these cases the squared model was a better fit. ^ one fewer in this mean, ^^ two fewer in this mean, ^^^ three fewer in this mean, etc . The highest scores for each competency are in **bold type**.

The highest average scores were usually achieved by children whose final ECE centre was in the top quartile for staff responsiveness other than for Fine Motor Skills. This quality item continued to have an association with children's Mathematics and PAT Reading Comprehension test scores after taking family income into account.

There were also some interactive effects, with the level of ECE staff responsiveness showing different patterns for children, depending on their family income. For children whose family incomes were more than $50,000, the level of staff responsiveness which made a positive difference to their Mathematics scores (by around 4 percentage points) came at the median. For children whose family incomes were $30–50,000, staff responsiveness had to be in the top quartile to make a difference, of around 20 percentage points. For children whose family incomes were below $30,000, it was the bottom quartile of ECE staff responsiveness which seemed to affect Mathematics scores, dropping them by 3–17 percentage points. Scores for children with family incomes above $30,000 whose ECE centre scored in the top quartile for staff responsiveness to children were much the same (72–74 percentage points), and around 20 percentage points ahead of children from low income homes whose ECE centre scored in the top quartile.

Taking maternal qualification into account made the associations with individual competencies indicative rather than statistically significant. However, we did find an interactive effect for the Composite Cognitive Competency, showing a linear advantage for children whose mothers' highest qualification was below tertiary, from 54 percentage points for children whose ECE centre had scored in the bottom quartile for staff responsiveness, to 65 percentage points for those whose ECE centre scored in the top quartile. Children whose mothers had a tertiary qualification scored much the same, around 69–71 percentage points, whatever the quality of staff responsiveness in their final ECE centre.

Tables 34 and 35 show the consistent patterns through time for Mathematics and the PAT Reading Comprehension test. The percentage point gap appears to widen over time for Mathematics (though this could be due to changes in the tests, particularly between age 6 and age 8); the top quartile is distinct from the other three. For the PAT Reading Comprehension test, the split comes at the median.

Table 34

Means for the Mathematics Measures at Ages 5, 6, 8 and 10 by Quartile Groups of ECE Staff Responsiveness

ECE Staff were Responsive to Children→ Competency↓	1st quartile	2nd quartile	3rd quartile	4th quartile	Prob. of F-value from anova	Percent variance acct. for	difference between highest & lowest
Age 5 Early Number Knowledge	49.6	*48.6*	50.3	**54.5**			4.9
Age 6 Number Knowledge	*75.4*	*75.4*	75.6	**80.5**			5.1
Age 8 Mathematics	60.4	*59.1*	66.7	**70.1**	0.007	4.3	9.7
Age 10 Mathematics	57.7	60.6	63.8	**70.8**	0.005	4.6	13.1

An effect of Responsiveness at ECE was also present for the Literacy measures at each of ages 5, 6 and 8.

Table 35

Means for the Literacy Measures at Ages 5, 6, 8 and 10 by Quartile Groups of ECE Staff Responsiveness

ECE Staff were Responsive to Children→ Competency↓	1st quartile	2nd quartile	3rd quartile	4th quartile	Prob. of F-value from anova	Percent variance acct. for	Difference between highest & lowest	below median, above median, and difference
Age 5 **Early Literacy**	66.9^	*64.6^*	71.2^^^	**74.3^**	**0.001**	5.3	7.4	65.6 73.0 7.5
Age 6 Word Recognition	18.1	*16.1*	19.2	22.0	0.036	2.9	3.9	16.9 20.8 3.9
Age 6 Invented Spelling	*54.6*	55.9	57.3	66.6	**0.007**	4.1	12.0	55.3 62.7 7.4
Age 8 PAT Reading	36.7	*35.4^*	42.3	**49.2^**	**0.0005**	6.2	12.5	36.0 46.3 10.3
Age 8 Burt Word Reading	*43.4*	45.2	48.0	**52.6^**	**0.0074**	4.2	9.2	44.5 50.7 6.2
Age 10 Literacy — PAT Reading Comprehension	43.2	46.4^^	54.0^	**55.0^**	**0.004**	4.0	11.8	45.0 54.6 9.5
Age 10 Literacy — Burt Word Reading	60.1	63.4	66.1	68.3	0.054	2.8	8.2	62.1 67.3 5.2

ECE Staff Guided Children in Centre Activities

This aspect of ECE quality also has a bearing on children's Mathematics and PAT Reading Comprehension test scores at age 10, separating out the top quartile of ECE centres. There is a marginal association with Individual Responsibility, separating out the bottom quartile. It is useful for ECE staff to show children how to use things or make them work rather than leave them to their own (or their peers') devices.

Table 36

ECE Staff Guidance of Children and Children's Competencies at Age 10

ECE Staff provided Guidance→ Competency↓	1st quartile *up to 3.6 mean* n=74	2nd quartile *3.6+ to 4 mean* n=65	3rd quartile *4+to 4.29 mean* n=74	4th quartile *4.29+ mean* n=61	Probability of F-value from anova	Percent variance accounted for
Individual Responsibility	62.8	68.9	71.0	68.9	0.057	2.7%
Mathematics	58.2	62.0	61.1	**71.6**	**0.005**	4.7%
Literacy —PAT Reading Comprehension	45.1^	47.7^	47.1^	**57.2^**	**0.009**	4.3%
Composite Cognitive Competency*	60.5^^	63.2^	62.5^	**68.4^**	**0.008**	4.4%

* In these cases the squared model was a better fit. ^ one fewer in this mean. ^^ two fewer in this mean. The highest scores for each competency are in **bold** type.

Moreover, the effectiveness of showing children how to use things or make them work in early childhood education appears to strengthen over time for Mathematics and for reading comprehension (less so for word recognition).

Table 37

Means for the Mathematics Measures at Ages 5, 6, 8 and 10 by Quartile Groups of ECE Staff Guidance of Children in Relation to Activities

ECE Staff guidance of Children in relation to Activities→ Competency↓	1st quartile	2nd quartile	3rd quartile	4th quartile	Prob. of F-value from anova	Percent variance acct. for	average of the first three quartiles & the highest quartile, and % difference between them		
Age 5 Early Number Knowledge	*48.5^*	**53.9**	48.8	51.8			50.2	51.8	1.6
Age 6 Number Knowledge	76.1	76.5	*75.8*	**78.5**			76.1	78.5	2.4
Age 8 Mathematics	60.7	*60.1*	63.2	**70.0^**	0.043	2.9	61.4	70.0	8.6
Age 10 Mathematics	58.2	62.0	61.1	71.6	0.005	4.7	60.4	71.6	11.2

Table 38

Means for the Literacy Measures at Ages 5, 6, 8 and 10 by Quartile Groups of ECE Staff Guidance of Children in Relation to Activities

ECE Staff guidance of children in relation to activities→ Competency↓	1st quartile	2nd quartile	3rd quartile	4th quartile	Prob. of F-value from anova	Percent variance acct. for	difference between the average of the first three quartiles & the highest quartile		
Age 5 **Early Literacy**	67.3	68.1	*65.8*	73.6	0.039	2.8	67.0	73.6	6.6
Age 6 Word Recognition	*16.4*	18.7	19.4	19.8			18.1	19.8	1.7
Age 6 Invented Spelling	*54.1*	58.8	59.1	62.4			57.2	62.4	5.2
Age 8 PAT Reading	*35.4*	38.8	40.4	47.3	0.017	3.6	38.1	47.3	9.2
Age 8 Burt Word Reading	*44.5*	46.6	47.2	50.4			46.0	50.4	4.4
Age 10 Literacy—PAT Reading Comprehension	45.1	47.7	47.1	57.2	0.009	3.6	46.6	57.2	10.6
Age 10 Literacy — Burt Word Reading	61.9	65.3	63.3	67.1			63.4	67.1	3.7

After taking family income into account, the associations with ECE staff guidance remained. A two-factor analysis of family income and the Composite Cognitive Competency showed that the benefits of attending a final ECE centre which was in the top quartile for the quality of staff guidance for children were most evident for children with family incomes below $70,000.

After taking maternal qualification into account, the associations with Mathematics and the Composite Cognitive Competency remained. Children whose mothers' highest qualification was none or mid-school had lower scores on the Composite Cognitive Competency if they had attended an ECE centre which was in the bottom quartile for staff guidance. By contrast, attendance at an ECE centre scoring in the top quartile made a positive difference for children whose mothers' highest qualification was senior school or trades.[38] There was no association between ECE staff guidance quality and the scores of children whose mothers had tertiary qualifications.

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[38] The same pattern was evident for Logical Problem-Solving—higher scores (11 percentage points) for children whose mothers' highest qualification was mid-school or trades, if they had attended an ECE centre rating in the top quartile for staff guidance; there were no associations, however, for other children.

ECE Staff Asked Open-ended Questions

The value of open-ended questions is that they encourage children to think for themselves, and to expand answers beyond a simple yes or no. As well as associations with Mathematics and the literacy measures—including writing—ECE centre scores on this quality item were also associated with children's scores for social skills.

Table 39

ECE Staff Asked Open-ended Questions and Children's Competencies at Age 10

ECE Staff asked open-ended questions→ Competency↓	1st quartile *up to 3* *mean* n=96	2nd quartile *3+ to 3.33* *mean* n=50	3rd quartile *3.33+ to 4* *mean* n=103	4th quartile *4+* *mean* n=25	Probability of F-value from anova	Percent variance accounted for
Social Skills with Peers*	67.5	66.6	69.0	**74.0**	0.057	2.7
Social Skills with Adults*	70.3	74.8	75.9	**82.2**	**0.007**	**4.4**
Mathematics	57.3	60.8	**68.0**	67.0	**0.005**	**4.6**
Literacy —PAT Reading Comprehension	42.2^^	51.9^	**52.9^**	52.4	**0.003**	**5.0**
Literacy —Burt Word Reading	59.7	65.9	67.7	64.3	0.014	3.8
Literacy —writing*	67.6	72.9	72.1^	**76.3**	**0.006**	**4.5**
Composite Competency*	66.0^^	68.8^	70.0^^	**72.9**	**0.012**	**4.0**
Composite Cognitive Competency*	59.4^^	63.5^	66.3^^	**66.6**	**0.002**	**5.3**

* In these cases the squared model was a better fit. ^ one fewer in this mean, ^^ two fewer in this mean.
The highest scores for each competency are in **bold** type.

This aspect of ECE centre quality shows more linear associations—that is, children's scores generally increasing in line with increases in quality—for Mathematics and Social Skills with Adults. For the Literacy measures, it is the children whose final ECE centre scored in the lowest quartile for this quality item who score lower than others.

These associations remained after taking family income into account, and applied to all income groups in much the same way. The associations with the Literacy measures remained after taking maternal qualification into account, but were diluted somewhat for Mathematics and Social Skills with Adults.

Like the other aspects of quality we have analysed so far, the value of asking open-ended questions of children in their ECE setting appears to grow with time, but only for Mathematics.

Table 40

Means for the Mathematics Measures at Ages 5, 6, 8 and 10 by Quartile Groups of ECE Staff Asking Open-ended Questions

ECE Staff asked open-ended questions→ Competency↓	1st quartile	2nd quartile	3rd quartile	4th quartile	Prob. of F-value from anova	Percent variance acct. for	below median, above median, and difference		
Age 5 Early Number Knowledge	*47.9*	52.6	50.9	**55.8**			49.4	51.8	2.4
Age 6 Number Knowledge	76.0	*75.6*	76.5	**81.9**			75.8	77.6	1.7
Age 8 Mathematics	*60.6*	62.6	65.3	**66.4**			61.3	65.5	4.3
Age 10 Mathematics	57.3	60.8	**68.0**	67.0	0.005	4.6	**58.5**	**67.8**	9.3

Table 41

Means for the Literacy Measures at Ages 5, 6, 8 and 10 by Quartile Groups of ECE Staff Asking Open-ended Questions

ECE staff asked open-ended questions → Competency↓	1st quartile	2nd quartile	3rd quartile	4th quartile	Prob. of F-value from anova	Percent variance acct. for	below median, above median, and difference		
Age 5 Early Literacy	66.5	*64.7*	70.6	**75.9**	0.034	2.9	65.9	71.6	5.7
Age 6 Word Recognition	*17.0*	18.9	19.7	18.9			17.6	19.5	1.9
Age 6 Invented Spelling	*55.6*	57.1	61.4	59.0			56.1	60.9	4.8
Age 8 PAT Reading Score	*34.9*	42.0	43.5	42.4	0.038	3.0	37.4	43.3	5.9
Age 8 Burt Word Reading	*42.8*	48.5	50.3	46.3	0.012	3.9	44.8	49.5	4.8
Age 10 Literacy —PAT Reading Comprehension	42.2	51.9^	52.9	52.4	0.003	5.0	45.6	52.8	7.2
Age 10 Literacy — Burt Word Reading	59.7	65.9	67.7	64.3	0.014	3.8	61.8	67.0	5.2

ECE Staff Joined Children in Their Play

This quality item also focuses on the interaction of children and adults. At age 10, we found associations with Mathematics, two of the Literacy measures, and a marginal association with Logical Problem-Solving. These showed higher scores for children whose final ECE centre scored in the top quartile for this aspect of quality.

Table 42

ECE Staff Joined Children in Their Play and Children's Competencies at Age 10

ECE Staff joined children in their play→ Competency↓	1st quartile *up to 3* *mean* n=89	2nd quartile *3+ to 3.33* *mean* n=45	3rd quartile *3.33+ to 4* *mean* n=84	4th quartile *4+* *mean* n=56	Probability of F-value from anova	Percent variance accounted for
Mathematics	62.9	57.1	60.4	**71.0**	**0.010**	**4.1**
Literacy —PAT Reading Comprehension	50.7^	44.3	45.8^	**54.9^^**	0.042	3.0
Literacy —reading age	11yr7mth	11yr6mth	10yr9mth	**12yrs**	**0.008**	**4.3**
Logical Problem-Solving*	62.3	59.1	59.6	**64.8**	0.058	2.7
Composite Competency*	68.9^^	66.7	67.1^	**72.4^^**	0.023	3.6
Composite Cognitive Competency*	63.9^^	59.6	61.4^	**69.0^^**	**0.002**	**5.4**

* In these cases the squared model was a better fit. ^ one fewer in this mean, ^^ two fewer in this mean.

These associations remained, slightly diluted, after taking family income into account; but after taking maternal education into account, they remained only for the literacy measures, not for Mathematics.

The increased association between Mathematics and literacy scores over time with attendance at an ECE centre scoring in the top quartile for staff joining in children's play is evident, but not as marked as it was for other aspects of staff:child interaction.

Table 43

Means for the Mathematics Measures at Ages 5, 6, 8 and 10 by Quartile Groups of ECE Staff Joining Children in Their Play

ECE Staff joined children in their play→ Competency↓	1st quartile	2nd quartile	3rd quartile	4th quartile	Prob. of F-value from anova	Percent variance acct. for	difference between the average of the first three quartiles & the highest quartile		
Age 5 Early Number Knowledge	51.7	48.0	*47.8*	**54.7**			49.5	54.7	5.2
Age 6 Number Knowledge	78.5	74.0	*73.6*	**80.3**	0.019	3.3	75.7	80.3	4.6
Age 8 Mathematics	64.1	61.1	*58.7*	**70.5**	0.016	3.7	61.4	70.5	9.1
Age 10 Mathematics	62.9	57.1	60.4	**71.0**	**0.010**	**4.1**	**60.8**	**71.0**	**10.2**

Table 44

Means for the Literacy Measures at Ages 5, 6, 8 and 10 by Quartile Groups of ECE Staff Joining Children in Their Play

ECE Staff joined children in their play→ Competency↓	1st quartile	2nd quartile	3rd quartile	4th quartile	Prob. of F-value from anova	Percent variance acct. for	difference between the average of the first three quartiles & the highest quartile		
Age 5 Early Literacy	68.8	66.4	*66.4*	**73.0**			67.4	73.0	5.6
Age 6 Word Recognition	18.9	17.6	*16.9*	**21.1**			17.9	21.1	3.2
Age 6 Invented Spelling	57.6	57.7	*56.5*	**63.0**			57.2	63.0	5.8
Age 8 Literacy—reading age	9yrs	*9yr2mth*	9yr3mth	**9yr9mth**			6.8	7.8	1.0
Age 10 Literacy—reading age	11yr8mth	11yr6mth	10yr9mth	**12yrs**	**0.008**	4.3	10.7	12.1	1.4
Age 8 PAT Reading Score	41.0	36.2	*36.5*	**47.5**	0.018	3.6	38.3	47.5	9.2
Age 8 Burt Word Reading Test	47.9	44.7	*43.8*	**52.1**	0.020	3.5	45.7	52.1	6.4
Age 10 Literacy —PAT Reading Comprehension	50.7	44.3	45.8	**54.9**	0.042	2.3	47.5	54.9	7.4
Age 10 Literacy — Burt Word Reading	66.0	61.1	61.9	**67.5**	0.12	2.1	63.4	67.5	4.1

Children Could Select Their Own Activities

At ages 5 and 8, we found that this item was positively associated with children's scores for Communication and Social Skills with Peers. At age 10, it was still showing significant associations with Social Skills with Peers, and indicative associations with Communication, Social Skills with Adults, and Mathematics. However, while children who had attended an ECE centre scoring above the median for being allowed to select their own activities showed higher scores for Social Skills with Peers, the associations with the other competencies give no clear messages: children who attended low scoring centres did as well as those attending high scoring centres.

Table 45

Children Could Select Their Own Activities at ECE and Children's Competencies at Age 10

Children could select their own activities at ECE→ Competency↓	1st quartile *up to 3* *mean* n=47	2nd quartile *3+ to 4.2* *mean* n=68	3rd quartile *4.2+to 4.9* *mean* n=77	4th quartile *5* *mean* n=82	Probability of F-value from anova	Percent variance accounted for
Individual Responsibility	63.8	65.5	67.9	**72.0**	0.072	2.6
Social Skills with Peers*	67.3	64.3	69.6	**71.7**	**0.001**	**5.6**
Social Skills with Adults*	72.3	70.4	**76.9**	76.2	0.045	2.9
Communication*	72.2	65.3	70.4	**73.5**	0.023	3.5
Mathematics	65.7	59.0	58.8	**68.2**	0.020	3.6
Composite Competency*	69.1^	65.7^	68.8^^	**70.8^**	0.039	3.1
Composite Social & Attitudinal Competency*	68.5	65.4	69.7	**71.6**	0.038	3.1

* In these cases the squared model was a better fit. ^ one fewer in this mean, ^^ two fewer in this mean.

These associations remained after taking family income and maternal qualification into account in separate two-factor analyses.

The association with Social Skills with Peers is strongest at the time children were in their final ECE centre, and five years later.

Table 46

Means for Social Skills with Peers at Ages 5, 6, 8 and 10 by Quartile Groups of Children Selecting Their Own Activities at ECE

Children could select their own activities at ECE→ Competency↓	1st quartile	2nd quartile	3rd quartile	4th quartile	Prob. of P-value from anova	Percent variance acct. for	below median, above median, and difference		
Age 5 Social Skills Peers	*64.6*	65.8^	69.3	71.9	0.010	3.7	65.3	70.7	5.4
Age 6 Social Skills Peers	66.6	*63.4*	64.3	67.5			64.7	66.0	1.3
Age 8 Social Skills Peers	*63.8*	64.5	65.2	69.7	0.011	3.9	64.2	67.6	3.4
Age 10 Social Skills Peers	67.3	64.3	69.6	71.7	0.001	5.6	65.5	70.7	5.2

ECE Centre Was a Print-saturated Environment

'Print-saturated' is a graphic way of describing ECE centres where the printed word was strongly in evidence. A centre which scored full marks for this item would have print visible on a variety of surfaces, such as posters, packets, charts, containers, and at a child's eye-level or just above. Much of the printed material would be child-focused. There would be a range of books readily accessible to children, and children would be encouraged to listen to and read stories, look at books, and be aware of print in use. Only a few ECE centres in the study scored 4 or 5 for this item.

The only clear linear association is with PAT Reading Comprehension. The signals are mixed in relation to Perseverance and Logical Problem-Solving. The signals were also mixed for Mathematics at ages 5, 6, and 8, with the highest scores coming in the second quartile also. The second quartile has an over-representation of children whose final ECE centre was playcentre. These children tended to score more highly for Perseverance up to age 8, and to have more or high income families and highly qualified mothers.[39]

At age 10, the lowest quartile is now separated out for Mathematics, and also for Burt Word Recognition. Somewhat surprisingly, there are no associations with writing.

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[39] We found a similar mixed pattern for the related quality item, *Stories were read/told/shared*, but with children whose ECE had scored in the third quartile scoring below others. This indicates some other factor at work.

Table 47

ECE Centre Was a 'Print-Saturated Environment' and Children's Competencies at Age 10

The ECE Centre was a 'Print-Saturated environment' → Competency↓	1st quartile *up to 3* *mean* n=73	2nd quartile *3+ to 3.67* *mean* n=71	3rd quartile *3.67+to 4* *mean* n=94	4th quartile *>4* *mean* n=36	Probability of F-value from anova	Percent variance acct. for
Perseverance	68.1	76.1	66.1	73.0	0.007	4.4
Mathematics	56.4	66.9	61.9	70.3	0.006	4.5
Literacy —PAT Reading Comprehension	39.1^	52.3	51.1^^	56.7^	0.00006	7.9
Literacy —Burt Word Reading	58.2	69.0	64.7	66.0	0.003	5.1
Literacy —reading age	11yrs	11yr9mth	11yr3mth	11yr7mth	0.013	3.9
Logical Problem-Solving*	57.1	65.8	60.8	63.4	0.0009	5.9
Composite Competency*	65.2^	71.6^	68.3^^	70.7^	0.002	5.4
Composite Cognitive Competency*	57.9^	66.4^	63.9^^	67.7^	0.0002	7.0
Composite Social & Attitudinal Competency*	66.8	72.2	68.1	69.6	0.079	2.5

* In these cases the squared model was a better fit. ^ one fewer in this mean, ^^ two fewer in this mean.

Looking at the overall trends in the Composite Cognitive Competency and Composite Competency, it appears that children whose final ECE centre offered little in the way of print exposure are disadvantaged in relation to others. There seems to be a minimum threshold below which ECE centres should not fall.

This association remained after taking into account family income. There was indeed a linear relationship between PAT Reading Comprehension scores for children from low income homes, rising from 32 percentage points for those whose final ECE centre had been in the bottom quartile for providing a print saturated environment, to 50 percentage points for those whose final ECE centre had been in the top quartile.

Maternal qualification had a stronger effect than the print saturated nature of children's final ECE, though indicative associations remained for PAT Reading Comprehension and Perseverance. This suggests that maternal education levels play a part in the choice of early childhood education centre, with well-educated mothers looking for evidence of printed material and its use in the centre.

Exposure to print in a child's final ECE centre appears to have a growing impact from age 6 to 8, and remains stable between ages 8 and 10 (the gap between the Burt Word Reading test scores of children in the lowest quartile and others increased from 4.1 at age 6 to 8.5 at age 8, and 8.2 at age 10). This quality item 'explains' an increasing amount of the variance of children's scores.

Table 48

Means for the Literacy Measures at Ages 5, 6, 8 and 10 by Quartile Groups of ECE having a 'Print-saturated' Environment

The ECE Centre was a 'Print-Saturated environment' → Competency↓	1st quartile	2nd quartile	3rd quartile	4th quartile	Prob. Of F-value from anova	Percent variance acct. for	diff. between the lowest quartile & the average of the last three quartiles		
Age 5 Early Literacy	*64.9*	**73.3**	67.8	68.3	0.017	3.4	64.9	69.9	5.0
Age 6 Word Recognition	*15.5*	**20.5**	18.9	19.5	0.054	2.6	15.5	19.6	4.1
Age 6 Invented Spelling	54.9	**64.7**	57.9	*53.4*	0.031	3.0	54.9	59.6	4.7
Age 8 PAT Reading	*31.1*	43.7	41.4	**48.3**	**0.00017**	7.0	31.1	43.5	12.4
Age 8 Burt Word Reading	*40.7*	49.5	48.9	**49.8**	**0.0019**	5.3	40.7	49.3	8.5
Age 10 Literacy —PAT Reading Comprehension	39.1	52.3	51.1	**56.7**	**0.00006**	7.9	39.1	52.6	13.5
Age 10 Literacy — Burt Word Reading	58.2	**69.0**	64.7	66.0	**0.003**	5.1	58.2	66.4	8.2

Enough Age-appropriate Resources to Avoid Waiting, Competing, Fighting

This quality item had an indicative association with Social Skills with Peers. In contrast to the staff-child interaction quality items, the impact of this association was strongest at the time. The break-point is at the median. At age 10, the association remained after taking family income and maternal qualification into account in separate two-factor analyses.

Table 49

Means for Social Skills with Peers at Ages 5, 6, 8 and 10 by Quartile Groups of Enough Age-appropriate Resources at ECE

ECE had enough age appropriate toys etc.→ Competency↓	1st quartile	2nd quartile	3rd quartile	4th quartile	Prob. of F-value from anova	Percent variance acct. for	Below median, above median, and difference		
Age 5 Social Skills Peers	*64.6*	67.0	70.8	**72.1**	**0.0027**	4.6	65.4	71.5	6.0
Age 6 Social Skills Peers	65.0	*63.4*	**67.8**	65.2			64.5	66.5	2.0
Age 8 Social Skills Peers	64.7	*63.3*	67.1	69.4	**0.010**	4.0	64.1	68.3	4.1
Age 10 Social Skills Peers	*66.6*	66.8	68.7	71.9	0.019	3.6%	66.7	70.4	3.7

Good Safety Practices

Only one association was evident with this aspect of ECE centre quality, with PAT Reading Comprehension, favouring children whose final ECE centre scored in the top quartile for providing a safe environment. This fits with earlier trends, which were not significant.

Table 50

Means for the Literacy Measures at Ages 5, 6, 8 and 10 by Quartile Groups of ECE Safety

ECE Safety→ Competency↓	1st quartile *up to 3.5* *mean* (n=67)	2nd quartile *3.5+ to 4* *mean* (n=112)	3rd quartile *4+to 4.17* *mean* (n=24)	4th quartile *4.17+* *mean* (n=71)	Prob. Of F-value from anova	Percent variance acct. for	diff. between the highest quartile & the average of the first three quartiles		
Age 5 Early Literacy	*66.3*	67.8	69.4	**71.5**			67.5	71.5	4.0
Age 6 Word Recognition	*17.3*	18.1	17.8	**20.6**			17.8	20.6	2.9
Age 6 Invented Spelling	*55.4*	58.7	58.8	**60.4**			57.6	60.4	2.8
Age 8 PAT Reading	*38.7*	38.4	39.4	**44.6**			38.6	44.6	5.9
Age 8 Burt Word Reading	*46.1*	*46.1*	46.2	**49.6**			46.1	49.6	3.5
Age 10 Literacy —PAT Reading Comprehension	46.3	46.3	48.0	**55.9**	0.022	3.6%	46.5	55.9	9.4
Age 10 Literacy — Burt Word Reading	62.9	64.1	62.2	**66.4**			63.5	66.4	2.9

The association remained after including maternal qualification into a two-factor model, but not after including family income. There is no direct or intuitive connection between safety practices and reading comprehension. This suggests that there may be some other factor underlying the result, for example, that centres which scored in the top quartile for this item also paid more attention to detail in children's play and staff:child interaction, or emphasised exposure to print more than others.

ECE Centre Equipment and Activities Encouraged Gross Motor Skills

Social Skills with Peers showed an indicative association with this quality item, with children whose final ECE scored in the top quartile having higher scores. There were also some mixed patterns for PAT Reading Comprehension, and the Burt Word Reading test, indicating some other factor at work. This is the first time this factor has shown an association; and there have been no associations with the quality item indicating provision of resources to encourage Fine Motor Skills. While there is some intuitive sense in the connection—children's play on large outdoor equipment often entails sharing and communicating with others—it may also be a one-off result.

Table 51

ECE Equipment and Activities Encourage Gross Motor Skills and Children's Competencies at Age 10

ECE equipment and activities encourage gross motor skills → Competency↓	1st quartile *up to 3.6* *mean* n=63	2nd quartile *3.6+ to 4.3* *mean* n=53	3rd quartile *4.3+to 4.9* *mean* n=70	4th quartile *5* *mean* n=88	Probability of F-value from anova	Percent variance accounted for
Social Skills with Peers*	67.1	66.3	67.7	**71.4**	0.045	2.9%
Literacy —PAT Reading Comprehension	50.5^	42.3^^	46.7^	**53.5**	0.022	3.5%
Literacy —Burt Word Reading	64.8	59.0	62.9	**68.1**	0.027	3.3%
Literacy —writing*	69.7	69.9	69.2^	**74.1**	0.064	

* In these cases the squared model was a better fit. ^ one fewer in this mean. ^^ two fewer in this mean.

The association with Social Skills with Peers remained after taking family income into account. There was an interaction with maternal qualification, showing that those who gained from experience in ECE centres in the top quartile for gross motor skills activities were the children whose mothers had no or mid-school qualifications, and not those whose mothers had more education.

Children Co-operated and Supported One Another

There are some indicative associations here, showing the highest scores for children whose final ECE centre fell into the middle band. This may indicate that in fact, some other factor is at work; but it is consistent with the findings for children's perceptions of their classrooms, indicating that children do not need totally calm and unproblematic relations with peers to make good progress.

Table 52

Children Co-operate and Support One Another at ECE and Children's Competencies at Age 10

Children co-operate and support one another at ECE→ Competency↓	≤3.6 *mean* n=85	>3.6 – 4 *mean* n=129	>4 *mean* n=59	Probability of F-value from anova	Percent variance acct. for
Literacy —PAT Reading Comprehension	45.1^	52.5^^	46.7^	0.039	
Literacy —writing*	71.3	72.6^	67.2	0.021	
Literacy —reading age	11yr3mth	11yr9mth	11yr1mth	0.039	
Logical Problem-Solving*	60.2	63.6	58.5	0.050	
Composite Competency*	67.1^	70.2^^^	67.5^	0.075	
Composite Cognitive Competency	61.5^	66.0^^^	60.5^	**0.010**	3.4%

* In these cases the squared model was a better fit. ^ one fewer in this mean, ^^ two fewer in this mean, ^^^ three fewer in this mean, etc.

These associations remained after taking family income and maternal qualification into account in separate two-factor analyses.

Children Allowed Time to Complete Activities

Only one association was evident, with Mathematics. This is a new association; earlier associations were found at ages 6 and 8 with Perseverance. Children whose final ECE centre scored in the top quartile for allowing children time to complete activities had higher Mathematics scores.

Table 53

Children Allowed Time to Complete Activities at ECE and Children's Competencies at Age 10

Children allowed time to complete activities at ECE→ Competency↓	1st quartile *≤3.7* *mean* n=69	2nd quartile *>3.7 – 4* *mean* n=77	3rd quartile *>4 – 4.9* *mean* n=67	4th quartile *>4.9* *mean* n=61	Probability of F-value from anova	Percent variance acct. for
Mathematics	60.1	59.7	62.8	70.0	0.033	3.2%

* In these cases the squared model was a better fit. ^ one fewer in this mean, ^^ two fewer in this mean, ^^^ three fewer in this mean, etc.

When we included family income in a two-factor model, the association with Mathematics was strengthened, and an indicative association with the Composite Cognitive Competency emerged. All the top scores for these measures had been for children who had attended centres in the top quartile for allowing children time to complete their activities.

Maternal qualification had a stronger association than this aspect of quality, again suggesting that the children of mothers with a higher level of education attended ECE centres which allowed activity completion.

Overview of ECE Quality Factors and Children's Competencies

The next chart provides an overview of the ECE quality factors which were related to children's competencies 5 years later. The items which are related all provide opportunities to develop familiarity with useful skills, to make connections, and to develop confidence in practical use of skills and knowledge. The ECE staff are key to the provision of these learning opportunities.

The ECE quality factors which emerge as most clearly associated with children's competencies at age 10 were (in no particular order):

- ECE staff are responsive to children
- ECE staff join children's play
- ECE staff ask children open-ended questions
- ECE staff guide children in the use of the activities
- The environment is print-saturated
- Children are allowed to complete their work
- Children can select their own activities from a variety of learning areas
- Children co-operate and support one another.

However, some of the items which did not show associations with children's competencies, such as working on problems, or evidence of artwork, could also fit the aspects which these items have in common. Our other finding, of the importance of the quality of the interaction between ECE staff and children, may explain why these activities did not show associations, though our data do not contain enough detail to test this interpretation.

Table 54

ECE Quality Indicators and Associations with Children's Competencies at Age 10

ECE Quality Indicator ↓	Perseverance	Individual Responsibility	Social skills Peers	Social Skills Adults	Communication	Mathematics	PAT	Burt	Writing	Reading Age	Logical Problem Solving	Composite	Cognitive Composite
Staff-Child Interaction													
Staff are Responsive						◆ F	◆ F					◆ F	◆ FM
Staff Model and encourage redirection, positive reinforcement etc.													
Staff guide children in the Context of the centre		◆				◆ FM	◆ F						◆ FM
Staff ask open-ended questions to Encourage own responses				◆ FM		◆ FM	◆ FM	◆ FM	◆ FM			◆ FM	◆ FM
Staff Join children in their Play						◆ F	◆ F			◆ FM	F	◆ F	◆ FM
Programme/Activity Focus													
Children can **Select** their own Activities			◆ FM		◆ FM	◆ FM						◆ FM	◆ F
The centre is a '**Print-Saturated** Environment'.	◆ FM					◆ F	◆ FM	◆ F			◆ FM	◆ FM	◆ FM
Children work on social and maths/science problems and **Experiment**													
Imaginative play													
Stories told							M	◆ FM	◆ FM				
Evidence of children's artwork and **Creativity**			◆ FM										
Physical Environment													
Enough age-appropriate **Toys** etc.			◆ FM										
Good Safety practices							◆ FM						
Equipment and activities encourage **Fine-motor-skills Development**									◆ FM	◆ FM			
Equipment and activities encourage **Gross-motor-skills Development**			◆ FM				◆ FM	◆ FM					
Easy Access indoors to outdoors													
Self Esteem													
Activities not sex-stereotyped			M										
Tikanga Maori evident													
Recognition of cultures													
Children **co-operate** and support one another							◆ F		◆ FM	FM	F		◆ FM
Children allowed time to **complete activities**						◆ FM							◆ FM

◆ = association

M= association remains after taking maternal qualification into account

F = association remains after taking family income into account

Links between the Quality Factors

Some of the associations with particular ECE quality factors might be attributable, at least in part, to the likelihood that a centre providing good quality in one aspect is more likely to do so for another. One way to explore this is to look at the correlations between the ECE quality factors used in this study. There are no clear-cut patterns, however. The full table is given in Appendix 3.

Relationship between ECE Quality Factors and ECE Socio-economic Mix

The socio-economic status of the children served by an ECE centre was one of the main factors associated with children's competency levels, and it remained a powerful factor in the multifactor analysis reported in Chapter 14, while the ECE quality factors 'disappeared'. When we look at the association of these aspects, and another powerful factor, maternal qualification, with the socio-economic mix of children's final ECE centre, we get some clues. Early childhood education centres serving children from mainly middle class families tended to score more highly than those serving children from mainly low income families, or those with what the centre's teachers described as a 'wide' social mix.

Table 55

Relationships Between Child's Final ECE Socio-economic Mix[40] *and Key ECE Quality Factors*

ECE socio-economic mix	Wide n=86 %	Middle n=117 %	Low-Middle n=60 %	Low n=39 %
ECE staff are responsive				
1st quartile	35	19	15	44
4th quartile (best)	15	33	25	10
ECE staff ask open-ended questions				
1st quartile	51	29	27	54
4th quartile (best)	6	14	8	0
ECE staff allow children time to complete activities				
1st quartile	34	25	18	33
4th quartile (best)	16	27	32	5
ECE 'print-saturated'				
1st quartile	35	17	28	44
4th quartile (best)	6	14	23	23
Mother's Qualification	n=80	n=113	n=57	n=35
	%	%	%	%
None	20	4	16	17
University	9	33	9	6

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[40] As described by the early childhood education teachers; the quality factors are rated by researchers.

Summary

Early childhood education experiences remained evident in the children's competency levels 5 years after they had left ECE to go on to school. In one respect, this seems remarkable, given that the ECE centres in the study were ordinary centres, without special programmes or resources, and that the children have had many other experiences since. It is, however, consistent with the persistent effects of other factors at work in children's early years, such as low levels of family income, or parental occupations at the time of the child's birth.

Children with longer ECE experience show higher scores in some competency measure. In contrast to some fears and some overseas findings, children who started their ECE experience before the age of 2 were not disadvantaged. Given the findings in this study of the enduring and sometimes growing links between some aspects of ECE quality and children's competency levels, it would be useful to know more about the quality of those children's first ECE experiences, to see if length is simply length, or if children who began their ECE earlier were in centres offering higher quality.

The competencies which are most strongly associated with ECE experience are the cognitive ones, Mathematics and literacy. Their strongest associations are with the interactions with staff and the resources which encourage thought,[41] dialogue, an interest in the world around children, and familiarity with print and symbols.

We found no associations between children's competency levels and their last ECE centre's rating for child-initiated dramatic play, or for children's working on problem-solving. This may indicate that it is individual children's own involvement in these particular activities which matters, rather than opportunity alone. Our analysis of the associations between children's competencies at age 5 and their interactions and activities in their final ECE (based on fieldworker observations) certainly suggests this (Wylie, Thompson & Kerslake-Hendricks, 1996, pp. 130–134).

The proportion of variance in children's scores explained by ECE factors in one-factor analyses was mostly 3–5 percent, with ECE socio-economic mix reaching around 14–15 percent.[42] A similar range of variance, 3–5 percent, is reported for a recent Swedish analysis of the relation of child care quality variables (including structural variables) to children's social and cognitive achievements (Sundell, 2000, p. 109), which also notes other studies finding a similar range.

This may seem moderate, but these contributions from early childhood education to children's competence compare favourably with effects related to other aspects of education occurring later, and they are persistent over time (Brooks-Gunn, 2000, pp. 15–16). Indeed, as we shall see in Chapter 14, the quality of early childhood education emerges as a key factor in accounting for differences in children's scores at age 10.

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[41] Anne Meade, with Pam Cubey (1996), provides a useful description of how teachers and parents can engage with children's growing interest in understanding particular processes to encourage their development of knowledge and thought (*Thinking Children*, Wellington: New Zealand Council for Educational Research). Margaret Carr's (1998) work on assessment in early childhood education is also recommended (*Assessing Children's Learning in Early Childhood Settings*. Three videos and a workshop booklet for practitioners. Wellington: New Zealand Council for Educational Research).

[42] The proportion of variance gives us an indication of one factor's contribution to another, but it also reflects the number of categories or levels within that factor. This adds a complication to directly comparing the proportion of variance explained by a factor with another, both within one study, and across different studies.

7 FAMILY RESOURCES

In this chapter we describe family resources available to the children, and any changes in those resources, or in other important aspects of the children's lives, between age 5 and age 10, and analyse the relationship of these resources to the children's competency levels at age 10. The resources we explore here are the tangible and intangible support available to children through their family income, parental education and employment, the number of parents in the family and whether they are the child's original biological parents, and the informal support parents have from family, friends, and neighbours.

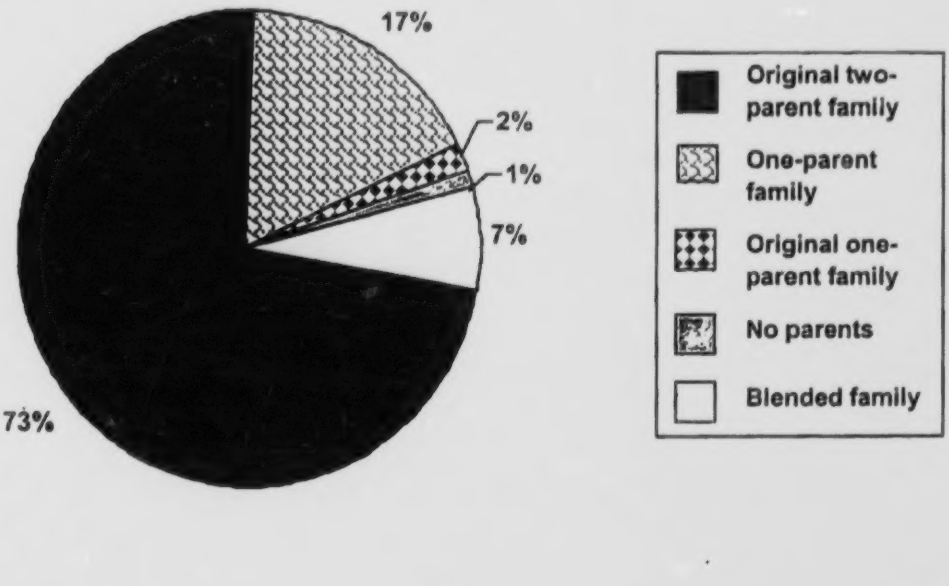
Family Composition

Ninety-five percent of the children were living in the same house as their birth mother, and 76 percent in the same house as their birth father. Seven percent of the children had a step-parent. Four percent also lived with their grandmother, 2 percent with their grandfather, 5 percent with another relative, and 2 percent with a non-relative.

At the age of 10, most of the children in the study remained in their original two-parent families (73 percent). Seventeen percent now lived in one-parent families that had originally had two parents (14 of these 88 families had the father only, and 74 the mother only). Seven percent of the children lived in two-parent families where one of the parents was not the biological parent (termed here 'blended families'). Two percent of the children remained in their original one-parent families (all with their mother). One percent (6 children) were cared for by their grandparents, another relative, or someone else.

Figure 4

Family Composition when Study Children Aged 10



Eighty-six percent of the children had siblings: 54 percent had one other biological sibling, 23 percent had two biological siblings, 7 percent had three, and 3 percent had between four and seven biological siblings. Most of the children in blended families had one sibling from a step-parent. Most of the households with another relative living with them had only one relative living with them, and most who shared their house with a non-relative did so with only one non-relative.

Overall, family relationships did not change much for the study children between age 8 and age 10. The number of children living in sole-parent families increased by 7, and no blended households were formed.

Family type had little bearing on most of the family and school resources and experiences available to the children in the study. Different family types were associated, however, with different experiences of change.

Family Type and Change

Children from original one-parent and two-parent families were less likely to have experienced noticeable change in their lives over the last two years (63 percent, compared with 85 percent of children from one-parent and blended families), or to have experienced financial difficulty during that period (1 percent, compared with 6 percent of blended families[43]).

Children from blended households were more likely than others to have shifted house (50 percent, compared with 23 percent), and to have experienced a new partner for their parent (56 percent), new siblings (22 percent), a change in their friends (17 percent, probably linked to change of residence and school), and a change in custody or access arrangements (11 percent). Thirty-nine percent of them changed school between age 8 and age 10, compared with 18 percent overall. Their parents were more likely to report no involvement in their child's school (19 percent, compared with 7 percent overall).

Parents in families which changed from two-parent to one-parent since the child's birth reported parental separations (30 percent), some changes in partners during the two years (13 percent), and changes in custody or access arrangements (13 percent). They were more likely to say that their child was unsettled (54 percent, compared with 34 percent overall), and to mention stress at home as a reason (17 percent, compared with 7 percent overall). They were also more likely not to be coping if they were upset (9 percent, compared with 5 percent overall). Parents in this family group were less likely to be satisfied with their child's school progress (57 percent, compared with 71 percent overall). Children from these families were less likely to belong to clubs or groups outside school (71 percent, compared with 84 percent overall), or to take outside lessons (37 percent, compared with 51 percent overall). They were more likely to watch television or go to the movies as a family (64 percent, compared with 50 percent overall), and to spend time with animals (12 percent, compared with 8 percent overall).

Original two-parent families had higher incomes than others, reflecting for many the advantage of having two adults in employment, higher salaries available to male earners, and the ability to share some childcare responsibilities. Fifty percent of these two-parent families had family incomes over $60,000 a year, compared with 36 percent of blended families, 8 percent of one-parent families, and no original one-parent families. At the other end of the income ladder the pattern almost reverses, with 70 percent of original one-parent families and 67 percent of one-parent families living on less than $30,000 a year, compared with 15 percent of blended families, and 5 percent of original two-parent families.

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[43] See Fleming (1999) for an insightful description of some of the issues facing reformed families, and the case for new understandings of family.

Original one-parent families were the most likely to spend half or more of their income on housing: 70 percent, compared with 28 percent of one-parent families, 19 percent of blended families, and 15 percent of original two-parent families.

Original two-parent families were most likely to have a home computer (85 percent, compared with 67 percent of other families), and to take part as a family in church/community/school/club activities (22 percent, compared with 7 percent of other families). Parents in these original two-parent families were more likely to belong to children's organisations (9 percent, compared with 2 percent of other families). They were less likely to use a paid caregiver to look after their 10-year-olds out of school (6 percent, compared with 14 percent of other families).

While their hopes for their children's further education were similar to others, one-parent families were more likely to see money as the stumbling block (60 percent of original one-parent families, 41 percent of one-parent families, compared with 31 percent of blended families, and 26 percent of original two-parent families). Saving for that education was most likely to occur in original two-parent families (45 percent, compared with 27 percent of other families).

Family type did not make much of a difference to the student socio-economic mix of the schools the study children attended, perhaps because there are more high decile primary schools in the Wellington area.

Yet despite these marked variations relating to income, family type on its own had little bearing on the children's competency levels. This is consistent with earlier findings in the study, and with US longitudinal studies (Wylie, forthcoming).

One-factor modelling showed one indicative contrast ($p=0.05$), for the competency measure of Individual Responsibility, favouring children in original two-parent families over those in one-parent families (70 percentage points, compared with 64 percentage points). Children from original one-parent families and blended families scored as well as those from original two-parent families. Given that this is the only competency showing a relationship with family type, the relationship found here may reflect other characteristics of this one-parent family group, rather than the difference in family type alone.[44]

Household Size

Most of the study children lived in households of 4 or 5 people (36 and 31 percent). Twelve percent lived in 3-person households, 13 percent in 6-person households, and 6 percent in households with 7 or more people. Only 2 percent of the children lived in two-person households. Six percent of the children's households at age 10 included a grandparent, 5 percent other relatives, and 2 percent non-relatives.

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[44] Most of the parental separations or the change from a two-parent to a one-parent family took place at least two years before the children were ten, so it is unlikely that this result reflects experiences related to recent parental separation.

Earlier phases of the Competent Children project showed no relationship between household size and children's competencies. An analysis of household size at age 10 in 3 levels—2–3 (small), 4–5 (medium), and 6 or more (large)—showed statistically significant associations with the Burt Word Reading test, with children in households of more than 6 members scoring less than others, and with reading age scores, favouring children in medium-size households. Only the Burt Word Reading test score remained significant after accounting for family income, now showing lower scores for children in large households. Adding family income to the model brought out some interesting interactions. Large household size did not affect the Mathematics scores of children from middle and high income families, but the Mathematics scores of children from low income families in large households were around half those for their peers in medium and small households (32 percentage points, compared with 63 and 38 percentage points respectively).[45] A similar but less dramatic pattern was evident for scores on the Burt Word Reading test, the PAT Reading Comprehension test and Logical Problem-Solving. Including maternal qualification in the model showed a significant association with Individual Responsibility, with lower scores for children in small households; indicative associations with Social Skills with Peers, again showing lower scores for children in small households; and no associations with the cognitive competencies.

We also estimated disposable income per family member in an analysis of current income levels, which is included in the section on family income.

Change in the Children's Lives

Sixty-five percent of the study children had moved house at least once since they were born. Twenty-seven percent had moved house once, 12 percent twice, 16 percent three or four times, and 10 percent had experienced 5 or more moves. Children from middle and high income homes were more likely to have stayed in one place or moved only once (64 percent, compared with 50 percent of children from low income homes). But the most mobile were the children in blended families, with only 14 percent of this group still in the same home as they were born in, or experiencing only one move.

When we analysed children's competency levels in terms of the number of housing shifts since the study child's birth, we found only one association, with Curiosity. This showed no clear pattern: the highest scores were for children who had either never moved, or moved 2–3 times, and the lowest average score was for children who had moved between 4 and 6 times. This association remained after taking family income and maternal qualification into account, but its lack of consistency suggests that the association is with some underlying factor rather than housing shifts per se.

Sixty-two percent of study parents reported changes in their family relationships since their child was born. Twenty-one percent of the study parents had experienced a partnership break-up and 7 percent said they now had a new partner. Forty-one percent said that there had been other changes in the household composition, such as the birth of another child and 3 percent now had a blended family, as a consequence of their new partner bringing their children in. Some had experienced the death of their partner (13 parents) or another family member living in the household (10 parents).

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[45] However, some caution is needed, since there were only 10 children in the sample in this category.

We also asked about more recent changes in the children's lives, occurring in the past 2 years. Thirty-one percent of the parents reported no changes, and another 31 percent mentioned one change only. Nineteen percent noted two changes, 11 percent three changes, and 8 percent four or more.

Moving house and changes in household composition such as the birth of a sibling continued to be the big sources of change, followed by changes in parental jobs or in hours worked.

Table 56

Changes in Children's Lives

Change	Change over 3-4 years, at age 5 (N=307) %	Change over 1 year between ages 5-6 (N=297) %	Change over 2 years between ages 6-8 (N=521) %	Change over 2 years between ages 8–10 (N=505) %
Moved house	50	19	21	23
Household composition changed	47	26	21	16
Parent changed job/work hours	22	16	10	15
Change of early childhood education centre (age5) or school (age 6&8)	14	4	7	12
Death of family member/friend	13	6	8	12
Accident/major surgery for family member	6	5	5	8
Child's friends	n/a	n/a	4	8
Death of pet	n/a	n/a	n/a	7
Parents separated	n/a	4	7	6
Parent has new partner	n/a	n/a	2	6
Increased demands of a household member	n/a	2	1	4
One parent often absent/absent long term	16	6	4	3
Parental stress	n/a	3	4	3
Custody/access arrangements	n/a	3	5	3
Child's class	n/a	n/a	4	3
Financial difficulty	5	1	1	2
Changes in extended family	n/a	n/a	n/a	1
Change of school	7	n/a	n/a	n/a

n/a = not asked

Among other changes in the study children's lives mentioned by parents were the child getting used to going to school alone now that an older sibling had changed school, and coping with changes of teacher. Home renovations, accompanied by the attendant household stress, overseas travel, especially to visit family members, and the acquisition of a new pet were also mentioned.

Changes in Children's Lives and Children's Competencies

We used one-factor modelling to explore whether there were associations between the changes in children's lives and their competency levels. We found only an indicative association with Logical Problem-Solving and parental reports that there had been some change, or with the number of changes reported. Children who had experienced some change scored 3 percentage points more than those who had not, an association which remained after taking family income and maternal qualification separately into account. But there was no clear pattern in relation to the number of changes. Given that the changes reported were quite varied, some impacting on much of daily life for some time, and others having perhaps a sharper but more limited impact, this is not surprising.

We therefore looked at each change separately, comparing the scores of children whose parents reported a particular change, and the scores of children whose parents reported no change of any kind. Only a few indicative associations were found with change where the parent reported stress or relationship problems, and these did not remain after taking family income or maternal qualification into account.

Family Income

Our sample comes from the Wellington region, which has a higher average income than New Zealand as a whole. The table below shows the family incomes of the children in the study between the ages of 5 and 10. It shows a growing proportion of families with annual gross incomes of $60,000 or more over the period, and a decline in those with less than $30,000 a year.[46] Much of this change reflects a growth in the proportion of two-earner families. When the children were near age 5, 19 percent of their mothers worked full-time. By age 10, 32 percent worked full-time, 38 percent part-time, and 8 percent had casual employment. Only 22 percent were not in paid employment.

Table 57

Family Incomes, Age 5 to 10

	<-$30,000	>30–40,000	>40–50,000	>50–60,000	> $60,000	n
Age 5	138	85	71	60	140	494
('93–'94)	28%	17%	14%	12%	28%	
Age 6	69	42	37	33	83	264[47]
('94–'95)	26%	16%	14%	13%	31%	
Age 8	114	55	72	72	183	496
('96–'97)	23%	11%	15%	15%	37%	
Age 10	94	60	59	67	202	482
('98–'99)	20%	12%	12%	14%	42%	

Linear correlations for family income at age 5 and later family income[48] were:
r=0.86 with family income at age 6
r=0.81 with family income at age 8
r=0.70 with family income at age 10.

The next table compares age 5 income level with age 10 income level. It shows that around half of the families in each income group below $70,000 improved their incomes over time. Families who had been in the highest income bracket at age 5 were most likely to still be in the same income bracket at age 10. However, about one in five of the families who had been in the top income bracket at age 5 were earning less at age 10.

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[46] Parents were read a list of income brackets, ranging from over $80,001 a year to $2,501–$5,000 a year before tax, and asked to indicate the bracket their family income fitted. It was decided to ask for income information in brackets because of the sensitivity of the question, the high proportion of those who do not know or cannot remember exact figures when asked (19 percent of one family households with school children in the 1996 Census), and because the main use of the information was to allow some comparison within the sample, rather than, for example, to establish adequacy of income against given expenditure.

[47] We have income data at ages 5, 8, and 10 for the full sample at age 10, but at age 6 only for the 'original' sample.

[48] Using the mid-points of income ranges.

Table 58

Family Income – Age 5 and Age 10 Compared

At age 5	At age 10	N	% age 5 in each income group
1. less than $30K	Less than $30k	65	50% (same)
	$30k–50k	47	36%
	$50–70k	15	11%
	>$70k	4	3%
2. $30–50k	Less than $30k	16	11%
	$30k–50k	55	37% (same)
	$50–70k	28	39%
	>$70k	20	13%
3. $50–70k	Less than $30k	5	5%
	$30k–50k	9	9%
	$50–70k	43	42% (same)
	>$70k	46	45%
4. >$70k	Less than $30k	4	4%
	$30k–50k	6	7%
	$50–70k	7	8%
	>$70k	74	81% (same)

Family Income and Children's Competencies

When the Competent Children study children were aged 8, we found that both current and previous family income levels were associated with children's competency levels. Family income at age 5 was more strongly associated than current family income with cognitive competencies—Mathematics, literacy, Logical Problem-Solving—and also with Individual Responsibility. We also found that children from families with current incomes of $60,000 or more had higher average scores for most of the competency measures than children who came from homes with incomes below $60,000. Many of the families with incomes of $60,000 or more were double income, 'work-rich' families (Callister, 1998). A third of the mothers in the high income families had university qualifications, compared with 10 percent of the middle income, and 7 percent of the low income families.

The first exploration of the relation of income to children's competency levels at age 10 was a series of linear regression analyses, testing the hypothesis that competency levels reflected family income levels, i.e. the higher the family income, the higher the child's competency level. We did this for income levels at all four ages when data were gathered, to see if earlier family income levels continued to have more of an association than current family income levels with children's competency levels.

Some linear associations which fitted this hypothesis were evident, but they were not strongly predictive of children's competency levels. The highest correlation between income and competency level was r=0.30. This means that there was an overlap in the range of scores for children in the lowest and highest income brackets. For example, when we plotted the data for PAT Reading Comprehension tests against family income levels, we found that the range of scores at age 10 for children whose family income at age 5 had been less than $30,000 was 2–90 percent; for those whose family income at age 5 had been more than $60,000, it was 12–95 percent. Children from the lowest income families are to be found among the highest scorers, and children from the highest income families, among the lowest scorers.

However, when we looked at the children who scored above the median for the composite competency score (this score is the average of a child's scores across all 10 competencies), we found that children from the lowest income bracket at age 5 were under-represented (26 percent, compared with 69 percent of children from the highest income bracket at age 5). Thus although some children from low income families do score highly, they are in the minority. The average score for children from low income families is lower than for children from high income families.

A set of analyses compared the actual proportions of children at each quartile for the different competency measures and their expected proportion if the distribution had occurred by chance, and there was no association with family income. These analyses were done in relation to family income levels at ages 5, 6, 8, and 10. These analyses[49] show that the associations of family income with competency levels occur only at the ends of the income range, affecting most the children from families with gross incomes of less than $30,000 a year, and those from families with gross incomes of more than $60,000 a year.

Children from the lowest income families were over-represented in the lowest quartiles and under-represented in the highest quartiles of competency scores at age 10, when we analysed *previous* family income levels. But when we analysed *current* family income levels, they were under-represented only in the top quartile. Conversely, children from the highest income families were over-represented in the highest quartiles, and under-represented in the lowest quartiles, for both *previous* and *current* family income.

Previous low family income level generally had stronger associations with children's competency levels at age 10 than current low family income. However, the associations favouring children from the highest income bracket remained much the same for both current and previous family income levels for Mathematics and reading, and grew stronger for Perseverance and Communication.

Table 59 gives the one-factor analysis of family income at age 5 and children's competencies at age 10. The boxes outlined indicate, for each competency, the income group whose average score is significantly different from the others. This is generally the lowest income group. However, they are rated the same as their peers in the $30-50,000 income bracket for Communication and Social Skills with Adults.

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[49] The full tables are included in Appendix 4.

Table 59

Family Income at Age 5 and Children's Competencies at Age 10

Family Income at age 5→ Competency↓	Income ≤$30K *mean* n=138	Income >$30K-$50K *mean* n=156	Income >$50K-$70K *mean* n=104	Income >$70K *mean* n=96	Probability of F-value from anova	Percent variance accounted for
Curiosity	*61.4*	63.2	63.3	**69.4**	**0.0063**	2.5%
Perseverance	*63.1*	70.9	72.8	**75.3**	**0.0000066**	5.4%
Individual Responsibility	*62.8*	69.5	70.0	**71.7**	**0.00096**	3.3%
Social Skills with Peers*	*64.4*	69.6	70.9	**71.1**	**0.0000063**	5.3%
Social Skills with Adults*	*71.0*	74.7	77.6	**78.6**	**0.0022**	2.9%
Communication*	*65.7*	70.9	73.0	**75.9**	**0.0000071**	5.3%
Mathematics	*54.3*	63.5	66.1	**72.0**	**0.000000021**	7.6%
Literacy —PAT Reading Comprehension	*40.6^^^^*	47.6^^	52.9	**59.0^**	**0.000000000091**	9.6%
Literacy —Burt Word Reading Test	*58.2*	65.0	66.4	**71.6**	**0.000000052**	7.2%
Literacy —writing *	*67.1^*	71.4	72.3	**74.6**	**0.00005**	4.5%
Literacy —reading age	*10yrs 8mths*	11yrs5mths	11yrs 7mths	**12yrs**	**0.000000031**	7.4%
Logical Problem-Solving*	*56.3*	61.5	62.5	**67.0**	**0.000000019**	7.6%
Composite Competency*	*64.3^^^^^*	68.9^^	70.5	**73.6^**	**0.0000000032**	9.3%
Composite Cognitive Competency*	*57.7^^^^^*	63.2^^	65.1	**70.0^**	**0.000000000016**	10.5%
Composite Social & Attitudinal Competency*	*64.7*	69.8	71.3	**73.7**	**0.0000015**	5.9%

* In these cases the squared model was used as it gave a better fit. ^ one fewer in this mean, ^^ two fewer in this mean, ^^^ three fewer in this mean, etc. The highest scores for each competency are in **bold** type.

At age 10, every competency except Fine Motor Skills shows some effect associated with age 5 family income. Family income accounts for more of the variance between the cognitive competencies—Mathematics, reading, and Logical problem-solving, but not writing—than it does for the social and attitudinal competencies.

Income differences at age 5 above $30,000 do not matter for Perseverance, Individual Responsibility, Social Skills with Peers, writing, or reading age at age 10. However, they do matter for some of the cognitive competency measures. Children from the highest income group do perform or are rated better than the two middle income groups, with family income of $30–70,000. The strongest indications of a linear relationship between family income and children's performance are found for the cognitive competency measures. The highest income group are also rated highest for Curiosity, with no differences between the lowest income group and the two middle income groups.

We did the same analysis in relation to the children's family income when they were aged 8.

Table 60

Family Income at Age 8 and Children's Competencies at Age 10

Family Income at age 8→ Competency↓	Income ≤$30K *mean* n=112	Income >$30K-$50K *mean* n=128	Income >$50K-$70K *mean* n=114	Income >$70K *mean* n=141	Probability of F-value from anova	Percent variance accounted for
Curiosity	*60.5*	61.4	65.3	**67.9**	**0.0028**	2.8%
Perseverance	65.8	*64.6*	72.6	**76.0**	**0.0000010**	6.0%
Individual Responsibility	*63.7*	64.1	**72.1**	71.7	**0.000054**	4.5%
Social Skills with Peers*	*64.7*	66.4	71.0	**71.7**	**0.0000016**	5.9%
Social Skills with Adults*	*69.1*	72.7	78.0	**79.6**	**0.0000011**	6.0%
Communication*	*66.5*	67.4	72.7	**75.8**	**0.0000017**	5.8%
Mathematics	57.2	*55.6*	66.1	**71.3**	**0.000000029**	8.3%
Literacy—PAT Reading Comprehension	*40.8^^*	45.6^^^^	49.1	**58.3^**	**0.0000000033**	9.1%
Literacy —Burt Word Recognition	*59.4*	61.0	65.1	**71.8**	**0.000000056**	8.1%
Literacy—writing*	*67.8^*	68.9	71.5	**74.9**	**0.000019**	4.9%
Literacy—reading age	*10yrs9mths*	10yrs11mths	11yrs	**12yrs 2mths**	**0.000000078**	7.9%
Logical Problem-Solving*	*57.7*	58.4	62.0	**66.0**	**0.00000058**	6.3%
Composite Competency*	*64.9^^^*	65.4^^^^	70.4	**73.6 ^**	**0.000000000014**	11.4%
Composite Cognitive Competency	*58.8^^^*	59.5^^^^	64.2	**69.5^**	**0.000000000089**	10.7%
Composite Social & Attitudinal Competency*	*65.0*	66.1	72.0	**73.8**	**0.000000030**	7.4%

* In these cases the squared model was used as it gave a better fit. ^ one fewer in this mean, ^^ two fewer in this mean, ^^^ three fewer in this mean, etc.

The highest scores for each competency are in bold type.

When we look at whether particular family income groups stand out, with substantially different average scores from children in other family income groups, there is one noticeable shift from the patterns evident in looking at the relation of family income at age 5 to children's competency levels at age 10. First, there is now little difference between the average scores for the lowest income group, and the second lowest income group. The 'break-point' is occurring more often at $50,000 than at $30,000.[50] This may simply reflect the fact that 28 percent of the second lowest income group at age 8 were children who had been in the lowest income group at age 5; so what we are seeing is the persistent effect of early low family income. This interpretation is borne out in our analysis of family income change.

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[50] The term 'break-point' is not meant to imply that the figures given are exact boundaries of different performance, or that a child from a family with an income of $51,000 would necessarily perform better than one with an income of $50,000. The figures used here are derived from our original categories.

Our final analysis of the relation of family income and children's competency levels at age 10 focused on current family income. We estimated the annual amount of income available per person in each household,[51] after allowing (broadly) for taxation and (broadly) for the proportion of family income spent on housing[52]. In the table below, the results of this calculation have been split into quartile groups to allow modelling. The amounts given should be seen as very broad estimates only.

Table 61

Available Income Per Person in Household at Age 10 and Children's Competencies at Age 10

Available income per person in Household→ Competency↓	Up to $3800 *mean* n=104	>$3800 to $6100 *mean* n=104	>$6100 to $8900 *mean* n=105	>$8900 *mean* n=113	Probability of F-value from anova	Percent variance acct. for
Curiosity	61.7	*61.6*	62.2	**67.8**	0.026	2.2%
Perseverance	*64.8*	68.4	70.4	**75.1**	**0.0013**	3.6%
Individual Responsibility	*63.6*	67.0	69.3	**71.6**	0.016	2.4%
Social Skills with Peers*	*65.5*	67.1	70.8	**71.1**	**0.00088**	3.8%
Social Skills with Adults*	*71.8*	*71.8*	77.2	**79.1**	**0.00065**	4.0%
Communication*	*67.1*	68.7	71.5	**76.0**	**0.00017**	4.6%
Mathematics	*53.6*	61.9	62.0	**70.3**	**0.0000034**	6.4%
Fine Motor Skills*	*83.4*	88.1	85.4	**87.0**	0.032	2.1%
Literacy—PAT Reading Comprehension	*41.2* ^^^^^	47.4 ^	49.1 ^^	**57.6**	**0.00000011**	8.0%
Literacy – Burt Word Reading	*58.9*	63.8	62.8	**71.5**	**0.0000014**	6.8%
Literacy—writing*	*67.3*	70.6	70.7	**74.7**	**0.00046**	4.2%
Literacy—reading age	*10yr9mth*	11yr2mth	11yr3mth	**12yr1mth**	**0.000011**	5.9%
Logical Problem-Solving*	*57.3*	61.9	60.7	**64.4**	**0.0011**	3.7%
Composite Competency*	*64.7*^^^^^	67.7^	69.0^^	**72.9**	**0.00000037**	7.6%
Composite Cognitive Competency*	*57.8* ^^^^^	62.9 ^	62.7 ^^	**68.5**	**0.000000058**	8.4%
Composite Social Competency*	*65.7*	67.4	70.2	**73.5**	**0.00011**	4.8%

* In these cases the squared model was used as it gave a better fit. ^ one fewer in this mean, ^^two fewer in this mean, ^^^ three fewer in this mean, etc.

The highest scores for each competency are in bold type.

By age 10, children in households which had the highest family income per person had the highest average scores, for all competencies. Those with the least amount of family income per household member had significantly lower average scores for Mathematics, PAT Reading Comprehension, and writing.[53]

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[51] Household members may include people who do not use the family income, such as grandparents and other relatives, and non-relatives.

[52] Parents were asked 'approximately how much of your family's monthly income, after tax has come off, is spent on housing (including rates, insurance etc)—one quarter, one third, one half?' At age 10, 5 percent of the families were mortgage or rent free, 40 percent of the families spent less than a quarter of their income on housing, 23 percent spent around a third, 13 percent around a half, and 5 percent spent more than half their income on housing. Thirteen percent of parents did not know how much of their income went on housing.

[53] The average number in the household for those who had the least amount of money per household member was 4.42; it was 4.61 in the group with the second-lowest amount per household member, 4.08 in the second-highest group, and 4.04 for the highest amount of income per household member.

We did not include maternal qualification in the above model of likely available income. but did add it to the one-factor modelling of family income at age 10 in relation to children's competencies. This model gives much the same picture as shown in the table above. But when we included maternal qualification, which had some much stronger and more sizeable effects, most of the associations related to family income were no longer evident. All that remained were contrasts between the high and low income groups for Social Skills with Peers, and for reading age. So maternal qualification has a greater bearing on children's competency levels than current family income level does.

However, maternal qualification and family income overlap quite markedly.[54] In part, this is because well-educated mothers were more likely to be partnered with men in professional occupations, earning middle to high salaries, and mothers without qualifications were more likely to be in one-parent families, and receiving a benefit. It is therefore hard to see each factor completely 'cleanly' and separately.

Table 62

Maternal Qualification and Family Income

Maternal Qualification→ Family Income↓ Per annum	No Qualification (n=64) %	Mid-senior school (n=187) %	Tertiary (n=68) %	University (n=78) %
> $60,000	13	34	51	70
$30–60,000	53	40	33	18
< $30,000	32	21	9	6

* Numbers do not add up to 100 percent, due to those who did not know or refused to answer the income question.

Change in Family Income Age 5–10

On the whole, the patterns evident in our analysis of change in family income over time suggest that the level of family income at age 5 matters far more than any rise, or fall, in family income between the ages of 5 and 10. The one exception is that children whose families had had medium level incomes at age 5, which then declined to below $30,000 by age 10, tended to have average scores, which were more similar to the scores of those who had started at the low income level.

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[54] The correlation is a moderate r=0.36, but the table shows why it is important to go beyond simple linear correlations, particularly with categorical material that does not show clear linearity.

Table 63

Income Changes between Ages 5 & 10 and Children's Competencies at Age 10
(low=<$30K, med $30–70K, hi= >$70k)

Income Changes→ Competency↓	low-low *mean* n=65	low >30-50K *mean* n=47	low->$50K *mean* n=19	med-low *mean* n=21	Med-med *mean* n=165	med-hi *mean* n=66	hi-low *mean* n=4	hi-med *mean* n=13	hi-hi *mean* n=74	Prob. of F-value	Percent var acct.
Curiosity	61.2	60.5	60.9	57.8	64.1	62.9	69.3	69.2	**69.9**	0.038	3.4%
Perseverance	63.3	64.9	56.9	68.2	71.9	71.5	**84.4**	74.0	75.3	0.00019	6.3%
Individual Responsibility	62.5	63.1	63.2	65.2	70.4	69.9	**78.8**	73.1	71.2	0.024	3.7%
Social Skills with Peers*	62.7	65.3	64.9	71.2	69.8	70.8	**75.7**	70.9	71.1	0.00017	6.3%
Social Skills with Adults*	70.9	70.5	71.4	70.2	75.2	79.4	**82.8**	80.8	78.5	0.010	4.2%
Communication*	65.4	66.7	64.1	68.8	71.8	72.3	**76.4**	75.2	76.1	0.0010	5.4%
Mathematics	56.7	50.3	54.2	58.1	65.2	62.7	72.5	59.2	**74.5**	0.00000019	9.5%
Literacy—PAT	39.9 ^^^	41.7 ^	39.8	47.4	50.5 ^^	48.2	40.9	46.2	**62.3^**	0.00000001	10.6%
Literacy—Burt Word Reading	58.7	60.1	53.9	63.0	65.6	65.9	68.6	59.8	**73.2**	0.0000040	8.1%
Literacy—writing*	67.3^	68.2	64.1	68.8	72.4	70.4	72.9	73.4	**75.2**	0.0013	5.3%
Literacy—reading age	10yr	11yr	10yr 1mth	11year 1mth	11 yr 6mth	11yr 2mth	12yr 2mth	10yr 3mth	**12yr 3mth**	0.00000028	9.3%
Logical Problem-Solving*	57.5	53.7	56.7	61.9	62.4	60.4	66.7	65.6	**67.3**	0.0000030	8.2%
Composite Competency*	65.0 ^^^^	63.9 ^	62.3	66.1	69.8 ^^	69.6	**75.1**	70.7	74.2^	0.000000066	10.1%
Composite Cognitive Competency*	59.2 ^^^^	56.6 ^	55.5	61.0	64.5 ^^	62.7	66.7	62.8	71.6^	0.0000000011	11.9%
Composite Social & Attitudinal Competency*	64.3	65.2	63.5	66.9	70.5	71.1	77.9	73.9	73.7	0.000079	6.7%

* In these cases the squared model was a better fit. ^one fewer in this mean, ^^two fewer in this mean, ^^^three fewer in this mean, etc. The highest scores for each competency are in **bold** type.

Children whose families had less than $30,000 in gross income when they were aged 5 tended to score less well than others, on average, even if their family income improved, for all competencies other than Curiosity. There are mixed signals among the scores of children whose families had formerly had high incomes: the decline in family income is not reflected in lower scores for the children whose family incomes went from high to low (but their numbers are very small); however, it was associated with lower scores for Mathematics and reading among the children whose incomes went from high to medium.

The level of family income at age 5 is likely to be highly correlated with the level of family income since the child's birth, probably even more highly than between age 5 and 10, given the greater flexibility for mothers to take employment once children are at school. Thus there are clear indications from this analysis that family income levels during a child's early childhood years do matter more than current family income for children's competency levels at age 10.

Family incomes did not necessarily fall or rise in a steady progression. Twenty-two of the children came from families which started with incomes below $50,000 at age 5, increased them to more than $50,000, then dropped back again to below $50,000 by age 10. Fifteen families showed the opposite pattern: a fluctuation from a high income level, above $50,000, falling below that, and rising again by age 10. The children from the latter group had much the same average scores as those whose family income at age 5 had been above $50,000, and was below that at age 10, with the exception of Perseverance.

On the whole, income levels are more important than patterns of income change.[55] When we modelled income change between age 5 and 10 with family income at age 5, family stability, and welfare receipt, we found that income change continued to show a difference in children's scores only for Mathematics (6 percentage points) and writing (3 percentage points), favouring children whose incomes did not change over the period.

Family Income and Patterns of Children's Progress

At age 8, our analysis of patterns in children's progress showed that children who started in the bottom quartile had a much greater chance of improving their performance relative to others by age 8, if their family income was high. Children from high income families who started with high levels of performance were more likely to maintain those levels. Children from low income families who started in the top quartile were more likely to show a decline in performance over time.

While these patterns continued between age 8 and age 10, the gaps were less marked, particularly for children performing in the top quartile at age 8. Again we see the importance of the first two to three years of school,[56] as the best opportunity to improve children's performance, particularly in Mathematics and reading.

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[55] We found one exception. There were 32 children whose family income moved upward between age 8 and 10, from $30–50,000 to $50–70,000. This group had lower average scores for most competencies than their peers in the $50–70,000 bracket whose family incomes had remained in that bracket between age 8 and age 10. One might expect this, since age 8 family income levels were more strongly associated with competency levels than age 10 family income levels. However, this group also had lower average scores for the competencies of Perseverance, Communication, and Individual Responsibility than their peers whose family incomes had remained below $30,000 for the whole five year period, and similar scores in the cognitive competencies (see Appendix 3 for details). Further exploration of some of the other characteristics of this group of 32 whose family incomes rose between age 8 and 10 is needed to shed more light on this pattern, and to see whether it is indeed the income increase which lies behind it, or some other factors, or combination of factors. We checked for changes in family status, but found that family stability for this group was in fact slightly higher than for the sample as a whole (82 percent remained in original two-parent families, compared with 72 percent for the sample as a whole).

[56] Our data collection was at age 6 and 8; had we collected data annually, we might well have found the first two years to be more important than the first three.

Table 64

Family Income – Progression from the Lowest Quartile Above the Median

Progress →	**% Quartile 1 age 5 – above median age 10**			**% Quartile 1 age 8 – above median age 10**		
Competency ↓	**low income**	**mid income**	**high income**	**low income**	**mid income**	**high income**
Curiosity	30	34	47	28	24	44
Perseverance	13	19	36	6	10	29
Individual Responsibility	36	28	43	20	14	24
Social Skills with Peers	31	41	60	28	25	77
Social Skills with Adults	28	30	48	29	23	35
Communication	25	41	38	19	27	41
Mathematics	13	11	30	4	8	11
PAT Reading Comprehension	4	17	55	12	3	8
Burt Word Reading	19	37	27	6	4	9
Writing	23	30	27	14	21	37
Reading age	15	20	36	4	17	7
Logical Problem-Solving	14	36	50	4	17	27

Table 65

Family Income – Retention of Top Quartile Above the Median

Retention →	**% Quartile 4 age 5 – above median age 10**			**% Quartile 4 age 8 – above median age 10**		
Competency ↓	**low income**	**mid income**	**high income**	**low income**	**mid income**	**high income**
Curiosity	45	33	58	48	59	64
Perseverance	45	48	59	26	67	70
Individual Responsibility	40	62	66	59	74	68
Social Skills with Peers	67	67	58	53	76	77
Social Skills with Adults	43	40	79	47	69	74
Communication	25	64	84	54	63	77
Mathematics	64	88	84	71	84	91
PAT Reading Comprehension	50	74	77	88	96	88
Burt Word Reading	50	87	70	100	100	98
Writing	40	61	67	57	67	65
Reading age	30	78	77	71	72	85
Logical Problem-Solving	31	68	100	76	92	96

Source of Income and Welfare Receipt

Wages or salary were the main sources of income for 56 percent of the study families.[57] For 8 percent, the main income source was self-employment, and for 11 percent, income came from both wages and self-employment.

Seventeen percent of the children's families received welfare as their main income source. Eleven percent received the Domestic Purposes benefit (DPB), which supports one-parent families. Six percent received other welfare benefits, mainly Unemployment or Sickness benefits. Forty-five percent of all families receiving a state benefit supplemented their benefit with income from wages.

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[57] This compares with 1996 Census figures for income sources for the age group 25–50 of 48 percent wages or salary, 16 percent self-employed, and 14 percent receiving government benefits.

Welfare benefits were significant sources of income for one-parent families. Seventy percent of intact one-parent families were receiving or had received a benefit in the previous two years, as had 60 percent of reformed one-parent families, compared with 8 percent of blended families, and 7 percent of intact two-parent families.

Two percent of families had made private maintenance arrangements in lieu of receipt of the DPB. Income from investments, family trusts or rental property was a main income source for a small number of families (2 percent).

Another 11 percent of the study families had received a welfare benefit within the previous two years, but were no longer getting one. Of the 56 families who were currently receiving the DPB, 39 had received it for more than two years. Half of those receiving other welfare benefits had also received them for more than two years.

An analysis of welfare history between the ages of 5 and 10 showed 83 percent of the study sample were in families that had never received welfare benefits. Five percent had received the DPB for less than 5 years, and 4 percent another benefit for less than 5 years. Five percent had received the DPB for more than 5 years, and 3 percent another benefit for more than 5 years.

Maternal qualifications had some bearing on benefit receipt. Thirty-eight percent of the families whose mother had no qualification were currently receiving a benefit, falling to 21 percent of those with a university qualification. A further 17 percent of the families whose mother had no qualification had received a benefit in the last two years, compared with 7 percent of those with a university qualification.

An analysis of the associations between children's competencies at age 10 and family type, income source, income change, and family income levels when the children were aged 5, showed that family income was the dominant factor of the four. When family income was taken into account, family stability, family income changes, and, on the whole, welfare receipt between the ages of 5 and 10 showed few associations with children's competency scores. There were very clear indications from the analysis of this data-set that family income levels within a child's early years have persistent effects, disadvantaging children from low income families (in this study up to $30,000), and advantaging those whose families had high incomes in the children's early formative years.

This persistent effect of family income may partially account for the finding that children whose parent received the DPB for 5 years or more were more likely to have lower scores than those who received it for shorter periods. However, these lower scores were evident for only three competencies: Perseverance, Social Skills with Peers and Individual Responsibility.

Disposable Family Income

Proportion of Income Spent on Housing

To give us some idea of disposable income, we asked parents to tell us approximately how much of their family income after tax was spent on housing. At age 10, 5 percent of the families were mortgage or rent free, 40 percent of the families spent less than a quarter of their income on housing, 23 percent around a third, 13 percent around a half, and 5 percent, more than half their income on housing. This is a slightly better picture than two years previously, when 23 percent were spending half or more of their family income on housing.

This better picture may reflect the rise in family income levels, but it may also reflect the higher proportion of parents who did not know how much of their family income went on housing (13 percent, compared with 8 percent at age 8).

Thirty-seven percent of families with incomes of less than $30,000 spent half or more of their income on housing, compared with 19 percent of those with incomes of $30-60,000, and 10 percent of those with incomes of more than $60,000.

Proportion of Income Spent on Housing and Children's Competencies

We modelled children's competencies at age 10 in relation to the proportion of family income spent on housing at ages 5, 8, and 10, in 3 levels: less than or equal to a quarter of family income, around a third of family income, and half or more. These are fairly crude indicators. In one-factor models, we found associations between family housing expenditure at ages 5 and 8 and over half of the competencies, but with family housing expenditure at age 10, only for Perseverance, Social Skills with Peers, Mathematics, and the PAT Reading Comprehension test.

The associations found in relation to the proportion of family income spent on housing at age 5 did not remain after including family income levels or maternal qualifications in separate models. However, the associations found in relation to housing expenditure at age 8 generally did remain after taking family income into account, though they were reduced, for Perseverance, Mathematics, and Logical Problem-Solving, and they remained after taking maternal qualification into account for Perseverance and Social Skills with Peers. Children in families which spent up to a quarter of their income on housing at age 8 tended to score more highly than others; there was no difference in scores between those whose families spent around a third, or half or more.

Maternal Education

Parental educational levels are known to affect children's academic performance. In the Competent Children project, we have focused on maternal education levels, mainly because most of the parents interviewed are the mothers of the children, particularly in one-parent families, and we wanted to track their own further participation in education, as well as qualifications achieved before children turned 5. In addition, maternal education is often more closely related to children's performance than paternal education (UNESCO 1997, pp. 20–21), probably because mothers often spend more time with children than do fathers (other than fathers in one-parent families). We would expect, however, to find similar patterns between paternal qualification levels and children's competency levels as we find for maternal qualification levels. We will include these in our analysis of the age 12 data from the Competent Children project.

We found that maternal qualification levels have an impact on Mathematics and Literacy levels from age 5, and on the social and attitudinal skills from age 6. The strength of the association between children's performance and maternal qualification levels grows more marked as children grow older, and have longer school histories. Maternal qualification levels made a larger contribution than family income levels to children's Mathematics and Literacy performance at ages 6 and 8. At age 8, children whose mothers had a university qualification scored more highly than those whose mothers had another tertiary qualification, such as teaching or nursing, or a trades qualification; these children in turn scored more highly than those whose mother's highest qualification was at school level, or no qualification. The PAT Reading Comprehension test was the only measure on which those children whose mothers did not have a school qualification performed worse than those whose mothers had a school qualification.

At age 10, there are strong associations between maternal qualification and Mathematics and reading—but not writing; and between some, but not all, of the attitudes and social skills. As before, children of university-qualified mothers had the highest scores. Children whose mothers had no qualification now showed lower scores than children whose mothers had a school qualification, for Mathematics, reading age, and Logical Problem-Solving, as well as the PAT Reading Comprehension test. But they did not differ significantly for the Burt Word Reading test, or for writing.

Table 66

Mother's Qualification and Children's Competencies at Age 10

Mother's Qualification→ Age 10 Competency↓	Mother Qual None *mean* n=64	Mother Qual Mid Sch *mean* n=121	Mother Qual Snr Sch *mean* n=18	Mother Qual Trade *mean* n=108	Mother Qual Tertiary *mean* n=82	Mother Qual Univ *mean* n=93	Probability of F-value from anova	Percent variance acct. for
Curiosity	62.1	61.4	60.2	62.3	67.1	**67.9**	0.039	2.4
Perseverance	66.2	65.8	66.3	69.5	74.5	**76.1**	**0.0004**	4.6
Social Skills with Adults*	70.1	72.4	79.5	75.3	77.7	**80.0**	**0.0008**	4.3
Communication*	65.4	68.1	75.9	70.3	73.0	**76.8**	**0.00001**	6.1
Mathematics	48.4	61.5	65.6	57.7	66.8	**77.3**	**5×10^{-15}**	14.7
Literacy —PAT Reading Comprehension	35.1^	45.8^^^	46.8	46.6	54.4	**61.2^**	**7×10^{-15}**	13.9
Literacy —Burt Word Reading	57.2	60.8	58.7	63.7	69.2	**72.3**	**0.00000001**	9.2
Literacy —writing*	68.8	68.9	68.2	71.0^	**74.2**	72.8	0.025	2.6
Literacy —reading age	10yr4mth	11yr1mth	11yr7mth	11yr2mth	11yr8mth	**12yr2mth**	**0.00000005**	8.4
Logical Problem-Solving*	55.2	59.4	62.0	60.8	63.0	**67.4**	**0.0000003**	7.6
Composite Competency*	64.1^	66.7^^^	68.6	68.1^	71.4	**74.1^**	**1×10^{-9}**	10.1
Composite Cognitive Competency*	55.2^	61.6^^^	62.1	61.1^	66.4	**71.3^**	**5×10^{-15}**	14.7
Composite Social & Attitudinal Competency*	66.3	66.7	69.5	69.4	72.3	**73.8**	**0.0002**	4.9

* In these cases the squared model was a better fit. ^ one fewer in this mean, ^^ two fewer in this mean, ^^^ three fewer in this mean, etc. The highest scores for each competency are in **bold type**.

As Table 66 shows, the differences related to the extreme levels of maternal qualification are generally larger than those found for the extreme levels of family income, particularly for Mathematics and the PAT Reading Comprehension test.

These associations remained after fitting family income into the model.

Maternal Qualification Levels and Children's Progression

Behind these different patterns at age 10 lie some important differences in progress since ages 5 and 8. Of the children whose scores fell in the lowest quartile at age 5, those whose mothers had a tertiary or university qualification were most likely to improve their performance over time. Starting in the bottom quartile did not present them with the strong disadvantage that it did for children whose mothers had mid-school or no qualifications, though some children whose mothers had little education did improve their performance. Initially low performing children whose mothers had low levels of qualification were just as likely as those whose mothers had high levels of qualification to do well by age 10 for writing and Communication. The progress of the initially low performing children whose mothers had middle levels of qualifications—a school or trades qualification—was better than those whose mothers had low levels of qualifications, for Social Skills with Adults, Communication, Mathematics, and Logical Problem-Solving, worse for writing and reading age, and much the same for the other competencies.

Low achieving children at age 8 whose mothers had a tertiary education were far more likely than others to improve their performance for Perseverance, Individual Responsibility, Curiosity, Mathematics, PAT Reading Comprehension, writing, reading age, and Logical Problem-Solving. The Burt Word Reading test stands out as an interesting exception to this pattern. Having a mother with a senior school or trades qualification was associated with greater progress between ages 8 and 10 than their peers, whose mother had low qualification levels, for Social Skills with Adults, reading age, and Logical Problem-Solving only.

Table 67

Maternal Qualification – Progression from the Lowest Quartile Above the Median

Children's progress →	% Quartile 1 age 5 – above median age 10			% Quartile 1 age 8 – above median age 10		
Competency↓	low qual	mid qual	high qual	low qual	mid qual	high qual
Curiosity	27	32	55	28	23	41
Perseverance	12	12	35	11	7	24
Individual Responsibility	34	32	45	16	9	27
Social Skills with Peers	36	40	64	31	31	24
Social Skills with Adults	17	40	50	27	37	29
Communication	28	43	31	31	15	33
Mathematics	6	14	42	8	8	17
PAT Reading Comprehension	9	11	55	7	6	11
Burt Word Reading	26	22	55	5	6	7
Writing	32	11	36	22	16	32
Reading age	24	6	36	8	12	16
Logical Problem-Solving	11	40	52	6	10	18

There is a somewhat different pattern for the initially high achievers. While most who started in the top quartile at age 5 were scoring well at age 10, the proportions are somewhat lower for children whose mothers had low qualification levels. However, if these children were in the top quartile at age 8, they were just as likely as others to be scoring well on the literacy and Logical Problem-Solving measures. Though most who were in the top quartile at age 8 scored above the median at age 10, children whose mothers had tertiary or university qualifications were more likely than those whose mothers had middle or low level qualifications to keep scoring well for Mathematics, and for the social and attitudinal competencies. The children in the top quartile at age 8 whose mothers had low qualification levels were less likely than their peers whose mothers had mid-level qualifications to score above the median for Curiosity, Perseverance, Social Skills with Adults, and Communication.

Table 68

Maternal Qualification – Retention of Top Quartile Above the Median

Children's retention →	% Quartile 4 age 5 – above median age 10			% Quartile 4 age 8 – above median age 10		
Competency↓	low qual	mid qual	high qual	low qual	mid qual	high qual
Curiosity	41	44	50	48	65	62
Perseverance	50	40	50	50	67	64
Individual Responsibility	50	58	45	65	66	78
Social Skills with Peers	56	74	67	66	67	82
Social Skills with Adults	45	40	88	45	68	70
Communication	47	65	79	51	60	80
Mathematics	67	88	93	70	72	96
PAT Reading Comprehension	57	81	78	90	95	92
Burt Word Reading	47	75	81	100	100	98
Writing	36	68	53	67	65	62
Reading age	40	81	78	72	86	76
Logical Problem-Solving	53	75	76	90	86	85

The patterns in these tables of children's progress from age 5 to 10 show a considerable advantage for those whose parent has a tertiary or university education.

The differences in patterns suggest that children's home experiences and interactions with parents and others, both prior to starting school, and during their school life, are important for their continued school progress. The weight of home experience is not surprising when one looks at how much time children spend outside school. Crooks & Caygill (1999, p. 19), calculate that by the time a child has finished primary school, they have had 24,000 waking hours before coming to school, 30,000 waking hours outside school—and only around 6,500 hours in class learning programmes.

It is more difficult for a child whose parent has limited educational success to progress from initially low levels of performance. It is more difficult for a child whose parent has limited educational success, but who starts well, to sustain that progress. However, if the progress is sustained to age 8, the foundations appear to be there for continued good achievement.

How might maternal qualification levels affect children, or shape their experience? What other factors might be involved, and 'lie behind' the association with maternal qualification that we see here? The next section brings together some of the descriptive material from the interviews with parents and children, to shed some more light on the confounding factors (such as engagement in school, in activities outside school, and parental interaction with the school).

What we find are not linear distinctions between each level of maternal qualification, but distinct patterns separating out either the children of mothers without qualification, or those whose mothers are university-qualified. The first group seem to draw on a narrower range of experiences, which may account for their finding school activities more interesting than others; but they also find the *work* of school more challenging, and less related to what they have experienced before school, or outside school (see Chapter 10 for more detail).

Their parents appear less confident in their interactions with school – just as likely to know the child's teacher, and work on problems together (though it would be interesting to know who raised these problems, parent or teacher), but less likely to want things to be done differently, to feel the grounds for critique. The overall picture is consistent with more qualitative accounts of 'cultural capital' differences (e.g. Lareau, 1997; Nash, 1993).

Mothers who had mid-senior school qualifications, or no qualification, were somewhat less likely to report their child's health as generally excellent or very good (62 percent, compared with 74 percent of parents with tertiary or university qualifications). They were more likely to report chronic illness (16 percent, compared with 11 percent of those with tertiary/university qualifications), or ear problems (6 percent, compared with 1 percent).

A quarter of the children whose mothers had no education did not belong to any clubs or groups, compared with 14 percent of others; and while they were just as likely to belong to sports clubs, they were less likely to be involved in children's service organisations, such as Brownies (11 percent, compared with 23 percent of others), or performing arts (6 percent, compared with 16 percent of others).

Patterns of lessons outside school, and, related to these, musical involvement, more clearly showed a linear relationship to maternal qualification levels. Twenty-five percent of children whose mothers had no qualification went to lessons outside school, rising to 71 percent of the children of mothers with university qualifications. Thirty-nine percent of the children of unqualified mothers had some involvement in music, rising to 68 percent of those with university-qualified mothers. And while maternal education made no difference to whether children sang in choirs or played in groups, it showed marked associations with the playing of a specific instrument, rising from 22 percent of the children of unqualified mothers to 63 percent of those with university qualifications.

Television watching patterns for both children and parents were also related to maternal qualification levels, with less television watched by those with highly qualified mothers.

Children whose mothers had no qualification were the least likely to remain at the school they had started in at age 5 (57 percent, compared with 70 percent of children whose mothers had some qualification). Sixteen percent had attended three or more schools, compared with 8 percent of those whose mothers had some qualification. School mobility reflected residential mobility. Parents with no qualification reported more shifts between houses, with 44 percent shifting 3 or more times since the child's birth, compared with 24 percent of parents with a qualification.

University-qualified mothers were the most likely to report computer use as one of their child's three main things they did outside school (38 percent, compared with 13 percent of mothers with no qualification). Mothers with no qualification were more likely to mention video games (27 percent, compared with 14 percent of university-educated mothers), and playing with siblings or friends (44 percent, compared with 30 percent of others), and less likely to mention making things (5 percent, compared with 12 percent of others).

While parental satisfaction with the child's school progress was unrelated to their own educational qualification, parents without qualifications were the least critical of what was happening at school: 75 percent did not want to change anything about what happened in their child's class, compared with 63 percent of those with mid-senior school qualifications, and 47 percent of parents with tertiary qualifications or university degrees. Yet parents without qualifications were just as likely as others to discuss a problem their child was experiencing with a teacher, whether academic or social. Parents with university degrees were more likely to experience mixed feelings about talking to their child's teacher about the child (14 percent, compared with 6 percent of others).

Parental aspirations for their child did not reflect family income levels, but they did reflect maternal qualifications. Only 36 percent of those without qualifications specifically mentioned university or tertiary education, rising to 49 percent of those with mid-senior school qualifications, 54 percent of the tertiary-qualified, and then rising again to 73 percent of those with university degrees.

However, saving for further education occurred at similar levels across the board (we did not ask for the sums involved), as did making decisions about secondary school. Reasons for the choice of secondary school[58] did vary in relation to maternal qualification. Educational standards or reputation were more important to university-qualified mothers (51 percent, compared with 34 percent of those with tertiary, school or no qualifications). So was the curriculum or programme on offer at the chosen secondary school (32 percent of university-educated mothers mentioned this, compared with 16 percent of others).

Parental Employment

Mothers

Before the study children started school, 19 percent of their mothers were in full-time paid employment, and 40 percent in part-time or casual paid employment. At age 10, 32 percent of the children's mothers were in full-time jobs, 46 percent were in part-time work (38 percent in part-time jobs, and 8 percent in casual employment), and only 22 percent were not in paid employment.

Just over half of the mothers who were not in paid employment would like paid work, and another 7 percent would like temporary work. Chief among the barriers to paid employment were the availability of work with flexible hours and decent pay rates, availability and affordability of childcare or after school care, the need to care for younger children, and job training. Poor parental health was also an impediment. In our sample, maternal qualification levels had no bearing on whether mothers were in paid employment, or whether they were working full-time or part-time.

The average number of hours per week worked by the employed mothers of the study children was 29. Mothers working part-time worked 19.09 hours a week on average, up from 15.23 hours at age 8. Mothers working full-time worked 42.14 hours a week on average, up from 40.87 hours at age 8.

A third of the women who were employed said that their job involved irregular hours, weekend work, shift work, long hours, or travel, and 7 percent held more than one job. Mothers working full-time were more likely to have a job which involved long hours, travel, or weekend work (54 percent, compared with 38 percent of mothers in part-time employment).

Mothers in professional jobs were most likely to be working full-time (55 percent, compared with 40 percent of mothers in skilled work, and 23 percent of those in unskilled work). Three-quarters of the mothers working part-time were doing unskilled work. This is likely to reflect the kind of work that is available with suitable hours for women who also carry the bulk of family responsibilities, and may also reflect the increased casualisation of unskilled jobs. In the next phase of the Competent Children project, we are asking mothers who are working part-time if they would like to increase their hours.

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[58] In response to an open-ended question.

There were no associations between maternal employment and children's competency levels at age 10: that is, whether a child's mother was in paid employment full-time, part-time, or not in the paid work-force, had little bearing on children's competency levels.

Employment status was also related to only a few small differences in maternal interests or support for the child. Women who were not in paid employment were more likely to mention magazines or newspapers as their preferred reading material (46 percent, compared with 35 percent of employed mothers), and less likely to mention fiction (45 percent, compared with 60 percent of those employed full-time, and 52 percent of those employed part-time). Mothers working full-time were more inclined to show a child how to do something if they experienced real difficulty with it (13 percent, compared with 7 percent of mothers working part-time or not in paid employment).

Fathers

Most fathers were in the paid workforce (94 percent), the majority working full-time (92 percent). Six percent of the fathers were unemployed. The average number of hours per week worked by the employed fathers of the study children was 48. Nearly two-thirds (65 percent) of the men worked irregular hours, at weekends, had long hours, did shift work, or travelled in their paid employment. Three percent held two jobs.

Parental Occupations and Maternal Qualifications

The links between maternal qualifications and the occupational levels of those who were employed are interesting. Access to professional occupations (those graded 1-2 on the Elley-Irving scale) is most clearly linked to having a university degree. However, access to skilled jobs (3-4 on the Elley-Irving scale) is equally likely for those with no formal educational qualifications and those with tertiary (non-university) education.

Table 69

Maternal Qualification and Occupational Levels

Maternal Qualification→	No Qualification (n=44)	Mid-senior school (n=179)	Tertiary (n=65)	University (n=72)
Occupation↓	%	%	%	%
Professional	2	20	32	65
Skilled	50	58	58	32
Unskilled	48	23	9	3

In addition, maternal qualifications were reflected in partners' occupations, as the following table (Table 70), using data for two-parent families, shows.

Table 70

Maternal Qualification and Partner's Occupation

Maternal Qualification→ Partner's Occupation↓	No Qualification (n=46) %	Mid-senior school (n=187) %	Tertiary (n=68) %	University (n=78) %
Professional	13	35	41	76
Skilled	65	51	24	24
Unskilled	22	13	12	0

Parental Employment and Children's Competencies

Maternal Employment Status

There were no links between current maternal employment status and children's competency levels at age 10.

Maternal Occupational Status

Current Occupation

As before, we found that current maternal occupational status (among those currently employed) showed associations with children's competency levels, particularly the cognitive competencies. In one-factor modelling, there were associations with Mathematics, literacy, Logical Problem-Solving, Communication, and Social Skills with Adults. But none of these associations remained after taking maternal qualification into account, though the associations with the cognitive competencies, other than writing, did remain after taking family income into account. Children whose mothers had professional jobs scored more highly than others for reading, Mathematics, and Logical Problem-Solving, but there were no differences in the scores of children whose mothers had skilled work and those whose mothers had unskilled work for the reading and Logical Problem-Solving measures.

Maternal Occupation at Birth of Her First Child

Most mothers work full-time before the birth of their first child. Scores for all the competencies bar Fine Motor Skills were associated with the mother's occupational status at the time her first child was born.[59] In one-factor modelling, children whose mothers had had professional work before becoming mothers had the highest scores, with no difference between children whose mothers had been in skilled or unskilled work, for Perseverance, Individual Responsibility, Social Skills with Peers, Social Skills with Adults, Communication, writing, and the Burt Word Reading test.

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[59] This analysis was done for the original sample only, since we asked only current occupation for the full sample when they were interviewed when their child was aged 5.

Table 71

Maternal Occupation at Birth of First Child and Children's Competencies at Age 10

Maternal Occupation→ Age 10 Competency↓	Professional *mean* n=79	Skilled *mean* n=136	Unskilled *mean* n=31	Probability of F-value from anova	Percent variance acct. for
Curiosity	**67.1**	62.2	55.5	**0.009**	**3.8**
Perseverance	**75.9**	68.9	61.9	**0.002**	**5.0**
Individual Responsibility	**73.0**	68.0	61.3	**0.009**	**3.8**
Social Skills with Peers*	71.7	68.0	66.9	0.054	2.4
Social Skills with Adults*	**80.1**	73.6	68.8	**0.002**	**5.0**
Communication*	**75.3**	69.5	64.0	**0.002**	**4.9**
Mathematics	**71.5**	60.9	49.0	**0.000005**	**9.5**
Literacy —PAT Reading Comprehension	**56.3**	47.6^^^^	39.0	**0.0003**	**6.7**
Literacy —Burt Word Reading	**70.6**	62.3	56.9	**0.0002**	**7.0**
Literacy —writing*	**75.2**	69.3	65.3^	**0.0002**	**6.8**
Literacy —reading age	**12yrs**	11yrs8mth	10yrs7mth	**0.001**	**5.5**
Logical Problem-Solving*	**65.9**	60.2	54.6	**0.0002**	**6.6**
Composite Competency*	**73.2**	68.0^^^^	61.9^	**0.000001**	**10.7**
Composite Cognitive Competency*	**69.0**	62.2^^^^	53.9^	**0.0000002**	**12.2**
Composite Social & Attitudinal Competency*	**73.8**	68.4	63.1	**0.0002**	**6.7**

* In these cases the squared model was a better fit. ^ one fewer in this mean, ^^ two fewer in this mean, ^^^. three fewer in this mean, etc. The highest scores for each competency are in **bold type**.

When we included family income in the model, the differences between children whose mothers had had professional work and those whose mothers had had unskilled work remained, but the differences with those whose mothers had had skilled work were no longer evident for Curiosity, Individual Responsibility, Social Skills with Peers, Communication, and reading age.

There was a correlation of r=0.48 between maternal qualification and maternal occupation before the birth of the first child. When we included maternal qualification in the model, we found that the associations with Social Skills with Peers, Social Skills with Adults, Communication, PAT Reading Comprehension test score and Logical Problem-Solving were no longer evident. The differences which do remain are between children whose mothers had had professional occupations and those whose mothers had had unskilled work, and not between those whose mothers had had professional work and those whose mothers had had skilled work.

Paternal Occupational Status

Current Paternal Occupation

Fathers' occupational status showed more associations with children's competency levels than did mothers' (perhaps because most fathers were in employment). The only competencies which were not associated with this were Social Skills with Peers and Fine Motor Skills. Generally, children whose fathers were in unskilled work had lower scores than others. Scores were alike for children whose fathers were in professional or skilled work for Individual Responsibility, Social Skills with Peers, Social Skills with Adults, Communication, and writing. Scores were different for children for each occupational group, with those whose fathers had professional work scoring highest, for Perseverance, Mathematics, the reading measures, and Logical Problem-Solving.

Table 72

Paternal Occupation when Child is Age 10 and Children's Competencies at Age 10

Paternal Occupation→ Age 10 Competency↓	Professional *mean* n=162	Skilled *mean* n=182	Unskilled *mean* n=46	Probability of F-value from anova	Percent variance acct. for
Curiosity	**66.4**	64.3	59.0	0.041	1.6
Perseverance	**75.1**	70.2	62.4	**0.0004**	**4.0**
Individual Responsibility	**72.5**	68.0	65.2	0.023	1.9
Social Skills with Adults*	**78.4**	76.2	67.8	**0.0009**	**3.5**
Communication*	**74.2**	70.8	66.7	**0.005**	**2.7**
Mathematics	**72.1**	59.7	49.1	4×10^{-11}	**11.7**
Literacy —PAT Reading Comprehension	**57.4^**	46.5^^	38.3^	6×10^{-9}	**9.4**
Literacy —Burt Word Reading	**68.7**	63.7	58.3	**0.0003**	**4.1**
Literacy —writing *	**73.3**	71.9	63.5	**0.00001**	**5.7**
Literacy —reading age	**12yrs**	11yr2mth	10yr7mth	**0.000001**	**6.8**
Logical Problem-Solving*	**65.3**	60.1	53.0	**0.00000007**	**8.2**
Composite Competency*	**72.6^^**	68.5^^	62.5^	**0.00000002**	**8.8**
Composite Cognitive Competency*	**68.7^^**	61.9^^	54.0^	2×10^{-11}	**12.1**
Composite Social & Attitudinal Competency*	**72.9**	69.8	64.5	**0.0004**	**4.0**

* In these cases the squared model was a better fit. ^ one fewer in this mean, ^^ two fewer in this mean, ^^^ three fewer in this mean, etc. The highest scores for each competency are in bold type.

Paternal occupation was usually a stronger factor than family income. All the differences in the table above remained after including family income in the model, with the exception of the Burt Word Reading test. The picture changes a little more when we included maternal qualification. The associations with Curiosity, Individual Responsibility, Social Skills with Peers, Communication, and the Burt Word Reading test were no longer evident, and the contrasts which remained for Perseverance were between children whose fathers had professional work, and those who had unskilled work. But on the whole, current paternal occupation continues to have an impact of its own, unlike current maternal occupation.

Current paternal occupation at age 10 also had more associations than current paternal occupation at age 8. This could simply reflect cumulative associations, or it could reflect children's growing ability to make links with their fathers' work through their own growth in reading, for example, or knowledge. We have not analysed the consistency of paternal occupations over time, which could throw some light on why we see some different patterns here at different ages.

Paternal[60] Occupation at the Birth of the First Child

Up to age 8, the associations between paternal occupation at the birth of the first child and children's current competency levels increased and strengthened over time. At age 10, associations are no longer evident with Perseverance and writing. Differences in children's scores are evident between each of the three occupational groups for Mathematics, the PAT Reading Comprehension test, reading age, Logical Problem-Solving, and Social Skills with Peers. There are no differences between the scores of children whose fathers had had professional or skilled work before they were born for Communication, Curiosity, Individual Responsibility, Social Skills with Adults, or the Burt Word Reading test.

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[60] This refers to the partner of the child's mother when the child was aged 5.

Table 73

Paternal Occupation at Birth of Family's First Child and Children's Competencies at Age 10

Paternal Occupation→ Age 10 Competency↓	Professional *mean* n=66	Skilled *mean* n=119	Unskilled *mean* n=31	Probability of F-value from anova	Percent varience acct. for
Curiosity	63.9	**64.3**	55.5	0.052	2.7
Individual Responsibility	73.4	68.8	63.4	0.042	2.9
Social Skills with Peers*	73.1	69.5	64.8	**0.004**	**5.1**
Social Skills with Adults*	77.8	75.7	68.3	0.030	3.2
Communication*	75.1	71.0	64.9	**0.009**	**4.4**
Mathematics	73.2	62.2	51.0	**0.00001**	**10.1**
Literacy —PAT Reading Comprehension	59.5	48.9^^	37.5^	**0.000006**	**10.8**
Literacy —Burt Word Reading	69.2	64.5	57.2	**0.005**	**4.8**
Literacy —reading age	12yrs2mth	11yrs4mth	10yrs7mth	**0.0003**	**7.4**
Logical Problem-Solving*	66.7	61.4	54.5	**0.0003**	**7.3**
Composite Competency*	72.9	69.1^^	63.1^^	**0.0001**	**8.4**
Composite Cognitive Competency*	69.3	63.3^^	55.5^^	**0.00001**	**10.1**
Composite Social & Attitudinal Competency*	72.9	70.0	64.1	**0.010**	**4.2**

* In these cases the squared model was a better fit. ^ one fewer in this mean, ^^ two fewer in this mean, ^^^ three fewer in this mean, etc. The highest scores for each competency are in **bold type**.

Including family income in the model left most of these associations intact, other than for the Burt Word Reading test. Including maternal qualification in the model showed that maternal qualification was the stronger factor of the two, leaving no association evident for Curiosity, Social Skills with Adults, Communication, or the Burt Word Reading test, and leaving only the differences between children whose fathers had had professional work and those whose fathers had had unskilled work before their birth for the competencies of Individual Responsibility, Social Skills with Peers, Mathematics, PAT Reading Comprehension test, reading age, and Logical Problem-Solving.

Care of Children

Few children were left at home alone after school. Only 4 percent said no-one was home when they got home. Eighty percent of the children said that a parent was at home when they returned from school. Twenty percent also mentioned siblings being at home after school, 9 percent another relative, and 3 percent another adult. Eight percent of the children were cared for by a caregiver after school, 6 percent in their own homes and 2 percent in the caregiver's home. Four percent attended an after school programme, and 3 percent each went to a relative's home, friend's place, or their parent's workplace after school. One percent were enrolled in a variety of sporting and cultural activities which occupied the time until their parents could pick them up.

Children from low income homes were more likely to have a relative home when they got home from school (15 percent), and less likely to go to a friend's or a relative's house (2 percent, compared with 7–8 percent for those from middle or high income homes). They were also less likely to wait at their parent's work (1 percent, compared with 4 percent of high income children, and 2 percent of middle income children), or to have a paid caregiver in their home (1 percent, compared with 2 percent of others).

Parents were largely self-reliant in looking after the study children before and after school, during school holidays, or when the children were sick (93 percent). Thirty-one percent could also call on grandparents or other relatives, and 8 percent each on a paid caregiver, or on friends. Ten percent used a school-related programme (such as after school care), up from 5 percent at age 6. One percent of the children used both a paid caregiver and a school-related programme. A further 1 percent mentioned using holiday programmes.

Mothers with university qualifications were most likely to call on friends (17 percent), a school-related programme (18 percent), or a paid caregiver (15 percent).

Main caregivers (mostly mothers) in full-time employment were most likely to use a range of different kinds of support.

Table 74

Main Caregiver Employment and Childcare at Age 10

Age 10 work status→ Childcare ↓	Full-time (n=153) %	Part-time (n=220) %	Not in paid work (n=119) %
Parent	89	96	94
Child's grandparents/other relatives	48	25	19
Paid caregiver	16	4	3
School-related programme/school care/OSCAR	15	9	3
Friend(s)	12	7	3

Informal Support for Parents

Most parents had informal support. If parents needed help, they were more likely to call on their friends, rather than on members of their extended family or their neighbours. Eighty-one percent of parents said that they could easily call on their friends if they needed help, 63 percent could turn to other family members, and 59 percent had neighbours readily available to lend a hand.

Parents of low income families were just as likely to have informal support they could call on as others were. Indeed, families whose mother had no qualification were most likely to have family they could call on easily (73 percent, falling to 49 percent of families with a university-educated mother).

Thirty-six percent of the parents interviewed felt they could easily call on family, friends, or neighbours for help; 29 percent could call on only two of these three sources of help, and 20 percent on only one of these sources.

Seven percent felt they could not easily call on any of these sources of informal support. Seventy percent of those who had no friends they could call on for help also lacked neighbours whom they felt they could ask for help.

Contact with Non-Resident Parents

Sixty-one percent of the children who had a parent no longer living at home continued to have regular contact with their non-resident parent.[61] Seventeen percent rarely saw, or had only irregular contact with, their non-resident parent (all fathers). Twenty-two percent no longer saw their parent: 13 percent had lost touch, and 9 percent had a deceased parent. Fathers comprised 88 percent of the non-resident parents (n = 112) in contact with the study children.

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[61] In Chapter 12, we report that non-resident parents also appear to stay in touch with their children's school.

Seventy-one percent of those who saw their non-resident parent got on well with them. However, 21 percent had an up-and-down relationship with their non-resident parent. At age 8, no child with non-resident parent had a poor relationship with their non-resident parent, compared with 6 percent at age 10.

The five things that children did most with non-resident parents[62]—physical and social-based activities, exploration, watching television and routine housework—were also those they did with their parents at home as a family. Sixty-seven percent took part in physical activities, 35 percent participated in social activities such as visiting other family members, 33 percent went to movies or watched television together, 27 percent engaged in exploration, outings, holidays, or attended special events, and 22 percent did routine things such as housework, gardening and shopping. Twenty percent of the children took part in computer or playstation activities with their non-resident parent (all fathers).

Summary

Often one-parent families and other families which have experienced change in formation are included in lists of 'risk factors' for children. Inasmuch as they are more likely to have low incomes, and may have parents with lower educational levels, this makes sense. But given the consistency with which longitudinal studies such as the Competent Children project are finding no separate contribution from family type to children's performance or achievement, one wonders whether this inclusion continues to make much sense. Looking at sole parenthood as a risk factor may provide some additional attention for children from low income homes, and it may provide these parents with some additional adult contact, but does this come at the cost of out-dated stereotypes?

The one-parent families in our study are not isolated; many children who do not live with one of their biological parents, usually the father, continue to have meaningful contact with that parent.[63] It is time to move away from confusing family forms with times of transition and alteration—during separation or divorce, family illness or death—when additional attention and support are highly desirable, and probably essential for children.

The same can be said in relation to income sources, and the inclusion of welfare receipt as another 'risk factor': it is an unnecessary inclusion, better replaced simply by low income, or low parental education.

Family income levels rose for many of the children's families over the last five years, particularly for two-parent families, where both parents were in paid employment. Family income levels do not have linear associations with children's competencies: we do not see competency levels rise in tandem with income. What we do see are some disadvantages for children in low income homes, which can persist from age 5, despite increased family income. This persistence of disadvantage for children from low income families points to the importance of social policy and public provision which support such families, to reduce the incidence of low income families, and to provide essential health and education for free, or at least at an affordable cost.

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[62] As reported by the resident parent.

[63] We realise that we have ourselves been guided by this stereotype, in asking about children's relationships with their parents only for children whose biological parents live apart.

There are advantages apparent for children in high income homes. Children from high income families at age 10 tend to have higher average scores than others for all the competencies. But the converse is not true: children from low income families have lower average scores only for Mathematics, PAT Reading Comprehension, and writing.[64] Unfortunately, these are key areas for both school work and later employment.

Our analysis of why low income children are disadvantaged in these areas suggests that it is not because of their attitudes or social skills: their average scores on our measures for these (including Perseverance, Individual Responsibility, and Communication) are no different from children in middle income families. What appears to be at work are lower levels of maternal education,[65] and fewer experiences of the kind which use and extend language and mathematics use. These are intertwined. This points again to the importance of having well-educated early childhood education teachers who can provide children from low income homes with such experiences, and who can work with parents to build parental confidence and knowledge.

Parental education overlaps with family income, which also overlaps with paid employment. Maternal employment in itself does not make a difference, either way, to children's competency levels. Though it is difficult to clearly separate out occupation from qualification level and income, there are some differences related to the kind of occupation. Parents in professional occupations are better placed to keep alive and active the kinds of knowledge and skills which best complement and support children's progress at school, in the everyday life at home in which children participate and learn.

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[64] There is a difference in average scores, but children from the highest income families are among the lowest scorers, and vice versa.

[65] Patterns of maternal qualifications are similar for the low income and middle income families in our sample. Twenty-two percent of the mothers in low income families in our sample had no qualification, 63 percent had a mid-senior school level qualification, 9 percent a tertiary, and 7 percent a university qualification. Mothers in the high income group show a very different pattern: 4 percent had no qualification, 42 percent a mid-senior level, 21 percent a tertiary, and 33 percent a university qualification.

8 CHILDREN'S AND PARENTS' LEISURE ACTIVITIES

In this chapter we look at other activities which can influence children's competency development. We describe family activities, children's favourite home activities, use of the family computer and the children's television watching—and some differences in how parents and children report these activities. We also describe parents' reading, television watching, and leisure-time activities.

Family Activities Involving the Child

The next table compares parental reports of family activities involving their child at age 10 with those at earlier ages. Family participation in physical activities and church or community activities has remained fairly constant from age 5 to age 10. Literacy activities were at a peak at age 5, when most children were discovering print. Routine housework was also highest at age 5 (probably with children as observers rather than participants). Eating out was least common at age 5. Sharing television and movie watching has almost doubled since ages 5 and 6.

Table 75

Family Activities with Study Children

Activity	When study child aged 5 (N = 307) %	When study child aged 6 (N = 297) %	When study child aged 8 (N = 521) %	When study child aged 10 (N = 505) %
Physical	90	90	88	88
Socialising with others	66	55	56	65
Exploration/special events	58	64	59	53
TV/movies	28	26	37	50
Routine housework	60	47	42	45
Eating out	15	27	22	23
Mathematics/science-related	24	21	11	21
Literacy-related	38	24	17	17
Church/community	19	15	16	17
Animals	18	13	9	8
Aesthetic-creative	14	9	9	6
Music/dance	9	8	6	6
Sociodramatic	9	4	6	5
Related to parents' employment	7	7	3	4
ECS-related (at 5); School-related (at 6,8,10)	5	10	3	3
Making things	–	–	–	2
Computer and video games	–	–	–	2

Fifteen percent of the parents mentioned 1–2 family activities, 48 percent mentioned 3–4, 27 percent mentioned 5–6 activities, and 9 percent mentioned 7 or more. University-educated mothers were most likely to mention literacy-related activities as something they did with their child at age 10 (29 percent, compared with 9 percent of mothers with no qualifications), as well as exploration, trips, or holidays (63 percent, compared with 45 percent of mothers with no qualifications).

Children's Favourite Home Activities

As they did when the children were aged 8, parents and children agreed that the three things children were most likely to be doing after school are watching television, engaging in physical play such as riding their bikes, or playing with other children. There has been a big increase in video games (mentioned by 4 percent of the study children at age 8, and 21 percent of the study children at age 10), and there is less mention of the visual arts and playing with toys (though not for boys).

Differences between children and their parents regarding children's use of the computer and video games narrowed between ages 8 and 10. However, there remained some differences between parents' and children's accounting for time spent on out-of-school activities. Parents were more likely to report their children engaging in cognitive or creative activities, such as reading, art, and handicrafts, than the children themselves were. Parents were also more likely to mention participation in organised out-of-school activities such as music, ballet, speech classes or sport. But children were three times more likely than parents to mention homework, and were also more likely to mention television.

Tabe 76 compares the children's responses with those of their parents.

Table 76

Activities Children Spend Most Time On at Home—Child and Parent Responses

Activity	Children at age 8 (N=523) %	Parents at age 8 (N=521) %	Children at age 10 (N=505) %	Parents at age 10 (N=505) %
Television	42	40	61	44
Physical	39	37	35	34
Playing with siblings/friends	39	32	31	33
Reading	19	36	23	31
Homework	9	2	21	7
Playing video games	4	4	21	19
Using the computer	15	22	19	22
Organised sport	6	8	10	14
Eating/sleeping/dressing/grooming	11	1	9	3
Playing with toys/dolls/guns etc	16	18	7	9
Art/drawing/photography	15	27	7	14
Making things/handicrafts/models	9	21	7	13
Housework/errands	7	2	7	3
Playing with animals	6	3	7	5
Music/ballet/drama/speech	7	9	6	10
Puzzles/games	6	4	4	4
Excursions/events	5	–	3	1
Listening to radio/CDs/records/tapes etc.	1	1	3	5
Shopping	5	–	2	–
Writing	3	9	2	4
Looking after other children	2	–	1	–
Social time with adults	5	1	1	2
Club/organisation (Brownies/after school care etc.)	1	1	1	2
Paid work/earn pocket money	1	–	1	0
Maths (not homework)	–	1	1	–
Fantasy games/pretend play	3	10	–	5
Extra tuition after school	–	1	–	–
Collect things	–	–	–	2

Children's reports of the three things they would spend most time doing did not vary according to their family income. Maternal qualification levels did show some differences. Children of university-educated mothers were most likely to mention computer use (33 percent, compared with 19 percent of others), and least likely to mention television (50 percent, compared with 64 percent of others). Reading was less mentioned by children of mothers with no qualifications (14 percent, compared with 38 percent of children of tertiary-qualified mothers, and 28 percent of children of university-qualified mothers). Sport was also less mentioned by children of mothers with no qualifications (3 percent, compared with 12 percent of others). Children whose mothers had no school qualifications, or mid-senior school qualifications, were more likely to mention playing with siblings or friends (34 percent, compared with 23 percent of children of tertiary or university-educated mothers).

Decile 1–2[66] school students were the least likely to mention computer use as a main activity out of school (2 percent). They were also the least likely to mention reading (13 percent, compared with 28 percent of decile 3–4 students and 24 percent of decile 5–10 students).

Gender and Children's Out of School Activities

At age 10, boys were seven times more likely than girls to report video game participation, and much more likely to mention organised sport, playing with toys and guns, and making things. At age 8, girls were twice as likely as boys to mention reading. At age 10, they were almost three times more likely than boys to report reading as one of their three main activities outside school. Girls were also more likely to mention performance, music, visual arts, animals – and housework.

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[66] Each New Zealand school receiving government funding is assigned a decile ranking which sums up a set of socio-economic variables drawn from census data at the mesh-block level, using the addresses of the school's children. Each decile should cover around 10 percent of the country's schools; decile 1 = lowest ranking on the socio-economic variables, and decile 10 = highest ranking.

Table 77

Gender and Activities Children Spend Most Time Doing at Age 10

Activity	Girls (n=239) %	Boys (n=268) %
Watch television	61	62
Play with friends	36	26
Reading	35	13
Physical activity	32	38
Homework	23	20
Use the computer	15	23
Music, ballet, drama	11	3
Art/drawing	11	5
Play with animals	11	3
Housework/ errands	10	5
Eating/sleeping	8	11
Organised sport	6	13
Play with toys dolls, guns etc	5	10
Puzzles/games	5	3
Play video games	5	36
Make things/handicrafts/models	3	10
Shopping	3	1
Writing	3	0
Look after other children	2	0
Excursions/events (e.g. concert)	1	0
Social time with adults	0	2
Club organisation (e.g. Brownies)	0	0
Church/Sunday school	0	1
Fantasy games/pretend play	0	0
Cultural club/language lessons	0	0
Paid work/earn pocket money	0	1

Parents' reports of children's main activities also showed some gender-related differences, as well as some differences between their own views and the children's views.

Parents of girls were more likely than girls themselves to mention reading and creative or imaginative activities as the girls' main activities outside school. The girls were more likely than their parents to mention television.

Boys' and parents' reports both show a significant increase since age 8 in boys playing video games, including the use of playstations, and a significant decrease in playing with toys. Parents were more likely than their sons to report boys' computer use – but the boys were more likely than their parents to report homework.

Children reported fewer informal social and creative activities, which may be linked to their increased reporting of homework and membership of sports, cultural and service clubs.

Table 78

Parental and Child Reports of the Activities Girls Spend Most Time Doing at Home Ages 8 and 10

	Age 8		Age 10	
	Parents (n=247)	Girls (n=248)	Parents (n=238)	Girls (n=239)
Activity	%	%	%	%
Watch television	37	32	38	61
Play with siblings	40	34	36	36
Reading	27	50	48	35
Physical activity	32	25	24	32
Homework	10	2	11	23
Use the computer	12	15	14	15
Art/drawing	23	35	18	11
Music, ballet, drama	11	15	17	11
Play with animals	8	4	8	11
Housework/errands	9	2	4	10
Eating/sleeping	13	1	3	8
Organised sport	2	3	9	6
Puzzles/games	7	2	2	5
Play video games	1	1	7	5
Play with toys, dolls, guns etc	15	16	8	5
Listen to tapes, records, CD, radio	n/a	n/a	9	4
Writing	6	17	7	3
Make things/handicrafts/models	6	15	13	3
Shopping	5	0	1	3
Look after other children	3	0	0	2
Excursions/events (e.g. concert)	4	0	0	1
Fantasy games/pretend	4	18	7	0
Church/Sunday school	1	1	0	0
Social time with adults	5	0	1	0
Club organisation (e.g. Brownies)	2	0	0	0
Paid work/earn pocket money	0	0	0	0
Collect things	n/a	n/a	1	0

Table 79

Parental and Child Reports of the Activities Boys Spend Most Time Doing at Home Ages 8 and 10

Activity	Age 8 Parents (n=274) %	Age 8 Boys (n=275) %	Age 10 Parents (n=267) %	Age 10 Boys (n=268) %
Watch television	47	47	50	62
Physical activity	48	45	43	38
Play video games	7	6	30	36
Play with siblings	30	39	30	26
Use the computer	29	18	30	23
Homework	2	8	4	20
Reading	23	12	17	13
Organised sport	13	10	20	13
Eating/sleeping	2	11	3	11
Play with toys, dolls, guns etc	20	18	10	10
Make things/handicrafts/models	26	12	12	10
Art/drawing	20	8	11	5
Housework/errands	2	5	2	5
Music, ballet, drama	4	4	5	3
Play with animals	3	4	3	3
Puzzles/games	6	6	5	3
Social time with adults	2	6	3	2
Paid work/earn pocket money	0	1	0	1
Shopping	0	5	0	1
Listen to tapes, records, CD, radio	n/a	n/a	1	1
Church/Sunday school	0	0	0	1
Fantasy games/pretend	3	2	3	0
Writing	2	1	2	0
Club organisation (e.g. Brownies)	1	0	0	0
Look after other children	0	0	0	0
Excursions/events (e.g. concert)	0	6	0	0
Collect things	n/a	n/a	2	0

Parental Spare Time Activities

What did parents do in their spare time? Physical activities, literacy related activities such as reading, routine housework, repairs and maintenance, visiting family, and friends or other social pursuits and watching TV or movies topped the list of things parents did in their spare time. Parents' activities did not change as much between years as their children's did.[67] Gender-related differences followed similar patterns for the children; in addition, fathers were more likely to be interested in physical activity (including sport), and mothers more likely to mention routine housework and garden work among the three main ways they spent their spare time.

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[67] Our data here is based on the reports of the parents we spoke to. Thus, we report data for 37 fathers from their own report, and 394 from their partner's report, and 470 for mothers from their own report, and 23 from their partner's report.

Table 80

Parental Spare Time Activities when the Study Children were Aged 8 and 10

	Age 8		Age 10	
	Mother (n=516)	Father (n=446)	Mother (n=493)	Father (n=433)
Activity	%	%	%	%
Literacy-related activities	57	28	62	33
Physical activities	39	56	46	55
Routine housework/gardening/home etc	42	27	41	34
Social-based activities	25	23	28	24
Watch TV/go to movies	19	25	21	26
Aesthetic/creative activities	27	3	20	3
Relaxation	16	9	19	11
Shopping	–	–	19	11
Church/community/club activities	4	3	7	3
Maths/science related activities	4	14	6	2
Study	4	1	5	1
Eat out	4	2	4	3
Animals	3	3	4	1
Exploration/special events/trips/holidays	3	3	4	3
No spare time	3	2	4	2
Making things	–	–	4	5
Computer activities	–	–	4	11
Socio-dramatic activities	8	7	2	2
Hobbies (unspecified)	1	8	2	3

Fifteen percent of the parents interviewed mentioned one spare-time activity only, 25 percent mentioned two, 29 percent mentioned 3, 17 percent mentioned 4, 8 percent mentioned 5, and 6 percent mentioned between 7 and 9 activities.

Parental interests were related to qualification levels. The overall picture is that mothers without qualifications had fewer active pursuits. A third liked simply to relax, decreasing with qualification levels to 12 percent of those with university education. Only 30 percent of the parents without qualifications mentioned physical activities, and 44 percent literacy-related activities (compared with 77 percent of the university-educated mothers for each), 5 percent music or dance (rising to 17 percent of the university-educated), and 8 percent aesthetic-creative activities. A similar picture of the relationship between maternal qualifications and activities was seen for fathers.

Membership of Organised Groups

Children

Neither the study children nor their parents saw participation in organised group activities as one of the three main things they did when not at school. Yet most children at age 10 had joined a club or were taking part in some form of group activity (84 percent, compared with 73 percent at age 8). Fifty-one percent of the children belonged to one organisation, 26 percent to two, and 6 percent to three or four organisations.

This increase in organised activities can be attributed to a significant rise in the membership of sports clubs and gyms, from 55 percent at age 8 to 70 percent at age 10. The study children had also increased their participation in the performing arts, from 10 percent at age 8 to 15 percent at age 10.

There was no significant change in membership of other group activities. Twenty-one percent belonged to children's service clubs such as Brownies, Cubs, or Keas. Ten percent mentioned church groups, and 4 percent ethnic or cultural groups. A few children had special interests in art or as collectors.

Eighty-seven percent of boys belonged to a club, compared with 80 percent of girls. The difference continues to reflect the high membership of sports clubs among boys: 80 percent, compared with 61 percent for girls. However, much of the overall growth in children's membership of sports and related group activities can be attributed to increasing participation by girls (61 percent at age 10, compared with 36 percent at age 8).

Girls remained much more likely to belong to arts groups (25 percent, compared with 6 percent for boys; at age 8, 17 percent of girls and 3 percent of boys had belonged to arts groups). They were also more likely to belong to uniformed or service groups (24 percent, compared with 18 percent for boys, whereas at age 8, 27 percent of girls and 17 percent of boys belonged to these).

Club or Group Membership and Children's Competencies at Age 10

Holloway (1999-2000) summarises US research showing the value of extra-curricular activities, such as sports, performing arts, and involvement in service organisations. Much of this research focuses on secondary students, and on extra-curricular activity organised by schools, rather than undertaken away from schools with different groups of peers, as it is for many primary students in New Zealand. It is not clear from Holloway's review whether family characteristics have been included in the US research.

For the Competent Children project children, club or group membership per se shows little association with children's competency levels. Indicative associations favouring those who did belong to a club or group were found for Social Skills with Peers and reading age, but these were no longer evident when we took family income and maternal qualification into account.

We analysed particular kinds of club or group membership, comparing the average scores of those who belonged, for example, to a sports club, with those who belonged to no club or group at all.[68] Membership of a performing arts group was the factor most highly associated with children's competency scores at age 10.

There were only indicative associations between sports club membership and Social Skills with Peers and reading age, but these did not survive the inclusion of family income or maternal qualification into the model.

Children who belonged to service clubs had higher scores for Individual Responsibility, Communication, Mathematics, reading age, and Logical Problem-Solving. After accounting for family income and maternal qualification, indicative associations remained for Mathematics and reading age.

Children who attended a church group scored around 4 percentage points higher for Social Skills with Peers than those who did not attend any club, though this association was no longer evident when family income and maternal qualification were included in the model.

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[68] This is a different approach from our analysis of reading, writing, and mathematical activities in the next chapter, since almost all the study children did some form of those activities, unlike belonging to clubs or groups.

There were no associations evident for membership of clubs which were formed around specific ethnic groups, or hobby groups.

Belonging to a performing arts group was associated with higher scores for all the competencies, other than Curiosity, Fine Motor Skills, and the Burt Word Reading test. The association with the PAT Reading Comprehension test was no longer evident after allowing for family income, but all the associations remained after including maternal qualification. Gender may be an underlying factor in the differences seen here: 81 percent of the children attending performing arts clubs were girls, compared with 42 percent of those attending sports clubs, 53 percent of those attending church groups, and 55 percent attending service clubs. However, while we did not include gender in our analysis of this factor, we did so in relation to performing arts lessons (see the next section) where a similar strong pattern of associations with competency levels was evident. We found gender made no difference to the associations.

Table 81

Performing Arts Group Membership and Children's Competencies at Age 10

Child belongs to a performing arts group→ Age 10 Competency↓	1 performing arts *mean* n=75	2 no clubs *mean* n=83	Probability of F-value from anova	Percent variance Accounted for
Perseverance	**77.9**	67.3	**0.0004**	**7.6**
Individual Responsibility	**76.5**	66.1	**0.001**	**6.7**
Social Skills with Peers*	**73.0**	66.5	**0.0004**	**7.7**
Social Skills with Adults*	**80.2**	71.9	**0.006**	**4.7**
Communication*	**77.3**	68.5	**0.0006**	**7.3**
Mathematics	**70.3**	60.1	**0.005**	**5.0**
Literacy —PAT Reading Comprehension	55.6	48.4^^	0.030	3.0
Literacy —writing*	**75.9**	70.0^	**0.006**	**4.8**
Literacy —reading age	**12yrs**	11yrs	**0.0005**	**7.5**
Logical Problem-Solving*	**66.3**	59.4	**0.003**	**5.4**
Composite Competency*	**73.8**	67.5^^^	**0.0003**	**8.2**
Composite Cognitive Competency*	**68.6**	62.6^^^	**0.003**	**5.5**
Composite Social & Attitudinal Competency*	**74.9**	67.0	**0.0004**	**7.8**

* In these cases the squared model was a better fit. ^ one fewer in this mean, ^^ two fewer in this mean, ^^^ three fewer in this mean, etc. The highest scores for each competency are in **bold** type.

Parents

Two-thirds of the parents and their partners belonged to an organisation outside the home. Parental involvement in organisations was concentrated in three main groupings: sport, service, or church. There was some growth for mothers in membership of children's and professional organisations over the two years since our last interview.

Table 82

Parental Membership of Organisations Outside the Home

	Age 8		Age 10	
	Mother (n=516)	Father (n=446)	Mother (n=493)	Father (n=433)
Organisation	%	%	%	%
None	38	39	33	32
Service (voluntary/community/school)	25	15	27	15
Sports related	25	34	25	35
Church related	13	12	17	10
Children's organisations	4	2	8	3
Professional organisations	2	5	6	8
Social	4	6	5	5
Cultural/ethnic	3	2	4	3
Hobbies/collectors	3	5	4	6
Arts performing—music, ballet, drama etc.	3	4	4	2
Arts, fine crafts	2	0	2	1
Self improvement	2	1	2	1
Conservation	1	2	2	2
Political/social action/union related	3	1	1	2

Thirty-seven percent of the parents interviewed mentioned one kind of organisation, 25 percent belonged to two kinds of organisation, 6 percent to three, and 1 percent to five different kinds of organisation. There was a stark difference in organisational membership associated with educational levels. Forty-seven percent of mothers with no qualifications belonged to some kind of organisation, compared with 84 percent of university-educated mothers.

Lessons or Coaching Outside School

Fifty-one percent of the children attended lessons or coaching outside school. Thirty-seven percent had lessons of one kind only, 12 percent had two, and 1 percent had three kinds of lessons outside school.

Girls were slightly more likely to go to lessons than boys (49 percent, compared with 44 percent), and were twice as likely as boys to have lessons in the performing arts. Their involvement in sports was similar.

Performing arts (30 percent) and sport (23 percent) were the main lessons children had outside school. Seven percent attended lessons or coaching in school-related subjects. Most of these children were rated by their teachers as being average or above average achievers. Three percent had tuition in the fine arts, and a small number attended classes related to a particular culture or ethnic group.

Attending lessons outside school was more likely for children whose parents wanted them to go on to tertiary study (63 percent, compared with 47 percent of other children). Children from homes where receipt of a state benefit or income support was a main source of family income were less likely to have outside lessons than children from other families (34 percent, compared to 54 percent).

Lessons Outside School and Children's Competency Levels at Age 10

Attending lessons outside school was associated with higher scores for children in all the competencies, other than Curiosity and Fine Motor Skills. This pattern is similar to the one found at age 8, though then there were no associations with Perseverance. When we included family income, there was no longer an association with Social Skills with Peers; when we included maternal qualification, the associations with Perseverance, Individual Responsibility, Social Skills with Peers, Social Skills with Adults, and the three reading measures were no longer evident.

As at age 8, the value of attending lessons outside school was attributable mainly to arts and sports lessons. However, taking sports lessons was *not* associated with higher scores in the social and attitudinal competencies, other than Communication, or in Fine Motor Skills.[69] The associations with the literacy measures and Communication were no longer evident once we took family income and maternal qualification into account, but the associations with Mathematics and Logical Problem-Solving remained.

Participation in performing arts lessons was associated with higher scores across the board. These associations remained after taking family income into account; the association with Curiosity was no longer evident after taking maternal qualification into account. The associations also remained after taking gender into account.

Table 83

Child has Performing Arts Lessons Outside School and Children's Competencies at Age 10

Child has performing arts lessons outside school→ Age 10 Competency↓	lessons *mean* n=153	no lessons *mean* n=248	Probability of F-value from anova	Percent variance accounted for
Curiosity	66.7	62.6	0.026	1.2
Perseverance	77.1	67.3	**0.0000008**	5.9
Individual Responsibility	74.4	66.3	**0.00003**	4.3
Social Skills with Peers*	72.3	67.4	**0.00005**	4.0
Social Skills with Adults*	80.6	72.8	**0.000005**	5.1
Communication*	77.3	68.2	**0.00000002**	7.7
Mathematics	72.0	57.7	**5×10^{-10}**	9.3
Fine Motor Skills*	88.3	85.5	0.019	1.4
Literacy—PAT Reading Comprehension	57.1	44.9	**0.00000002**	7.8
Literacy —Burt Word Reading	69.2	61.9^^^^^^	**0.00003**	4.2
Literacy —writing*	74.6	69.9^	**0.0004**	3.1
Literacy —reading age	12yr1mth	11yr1mth	**0.0000001**	6.8
Logical Problem-Solving*	67.3	58.1	**1×10^{-11}**	10.9
Composite Competency*	74.0	66.7^^^^^^^	**4×10^{-11}**	10.6
Composite Cognitive Competency*	69.3	60.5^^^^^^^	**8×10^{-11}**	10.2
Composite Social & Attitudinal Competency*	74.8	67.4	**0.00000007**	7.1

* In these cases the squared model was a better fit. ^ one fewer in this mean, ^^ two fewer in this mean, ^^^ three fewer in this mean, etc. The highest scores for each competency are in **bold** type.

Participation in fine arts lessons (18 children) was also associated with higher scores—though not for Curiosity, Individual Responsibility, Social Skills with Peers, or, somewhat surprisingly, Fine Motor Skills. These associations remained after taking family income and maternal qualification into account.

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[69] Our comparison here is with the children who did not attend any lessons outside school.

Seven percent of the study children were taking lessons in academic subjects outside school, almost double the 4 percent doing so at age 8. We did not ask whether the lessons were being taken because of concern at the child's school progress, though this seems likely, and a likely explanation of the lower scores evident for children who were taking academic lessons outside school. However, these differences were not significant, except for Social Skills with Peers, and Fine Motor Skills. There was an indicative association with reading age. These differences remained after taking family income and maternal qualification into account. We cannot tell from this analysis whether lessons outside school benefit children's learning; a future investigation could be done which compares the children taking lessons at ages 8, 10, and 12 with a group which had a similar level of performance at age 8, but did not take such lessons.

Music

More study children were reported by their parents to play a musical instrument or take part in a musical group at age 10 than at age 8 (51 percent, compared with 40 percent). Nine percent of the children participated in two different kinds of musical activity, and 1 percent in three different kinds.

Most of the musical involvement was playing a specific instrument (39 percent, compared with 32 percent at age 8). Fifteen percent had joined a choir (8 percent at age 8) and 7 percent played an instrument in an orchestra or cultural group (3 percent at age 8). Sixty-five percent of girls played a musical instrument or participated in a musical group, compared with 39 percent of boys. Children from high income families were somewhat more likely to play a specific instrument (47 percent, compared with 35 percent of children from low income families, and 29 percent of those from middle income families).

At age 8, children who were engaged in music showed higher scores for all the competencies except Curiosity. At age 10, Curiosity showed an indicative association, but there was no longer an association with Fine Motor Skills.

Table 84

Playing Musical Instrument or Participating in a Musical Group and Children's Competencies at Age 10

Child plays a musical instrument or participates in a musical group→ Age 10 Competency↓	yes *mean* n=258	no *mean* n=246	Probability of F-value from anova	Percent variance accounted for
Curiosity	65.8	62.1	0.021	1.1
Perseverance	74.3	65.8	**0.0000008**	**4.7**
Individual Responsibility	72.1	64.3	**0.000003**	**4.2**
Social Skills with Peers*	71.0	66.4	**0.00002**	**3.6**
Social Skills with Adults*	78.1	72.2	**0.00004**	**3.3**
Communication*	74.3	67.4	**0.0000002**	**5.2**
Mathematics	66.9	58.8	**0.00006**	**3.1**
Literacy —PAT Reading Comprehension	53.8^	43.9^^^^^	**0.0000003**	**5.2**
Literacy —Burt Word Reading	67.6	61.5	**0.00007**	**3.1**
Literacy —writing*	73.5^	68.6	**0.000008**	**3.9**
Literacy —reading age	11yr9mth	11yrs	**0.0000009**	**4.7**
Logical Problem-Solving*	64.1	58.5	**0.000004**	**4.2**
Composite Competency*	71.8^^	65.9^^^^^	**0.0000000002**	**7.8**
Composite Cognitive Competency*	66.5^^	60.2^^^^^	**0.0000001**	**5.5**
Composite Social & Attitudinal Competency*	72.6	66.3	**0.0000001**	**5.5**

* In these cases the squared model was a better fit. ^ one fewer in this mean, ^^ two fewer in this mean, ^^^ three fewer in this mean, etc. The highest scores for each competency are in **bold type**.

The associations with musical performance remained after taking family income into account. But there were substantial interactions, showing positive associations between musical involvement and children's scores only for middle income groups ($30–70,000). Musical involvement had no relationship with the scores of children from low income or high income families, other than for Curiosity, and for the low income group, for Perseverance. However, when mother's qualification was taken into account, the positive associations with musical involvement were much the same for all children, independent of their mother's qualification. Logical Problem-Solving was the one exception: in this case, musical involvement showed no association with the scores of children whose mothers had no qualification, or whose mothers had a university degree.

Why should there be different patterns related to income? We analysed separately the three main kinds of children's involvement in music: playing a specific instrument, singing in a choir, and playing in an orchestra or cultural group. The comparison is with those who are not involved in any music making at all. The chart below shows no great differences in the advantages of each kind of music making.

Table 85

Specific Musical Activities and Percentage Point Differences

Activity → Competency↓	Musical Instrument	Choir	Group/ Orchestra
Curiosity	5.2		6.9
Perseverance	9.5	7.8	11.6
Individual Responsibility	8.5	7.8	9
Social Skills with Peers	5	5	
Social Skills with Adults	6.3	4.6	7.4
Communication	7.8	6.3	7.4
Mathematics	9.5	7.9	
Fine Motor Skills			
PAT Reading Comprehension	11.5	9.6	9.8
Burt Word Reading	6.2	8	9.3
Writing	4.7	6.8	6.5
Reading age	1.7	1.9	
Logical Problem-Solving	6.4	5.3	6.9
Composite Competency	6.6	5.2	7.5
Composite Cognitive Competency	7.2	6.7	7
Composite Social & Attitudinal Competency	7	5.1	7.9

These associations remained after taking family income and maternal qualification into account. However, the same pattern of interactions found for the general music making factor, with positive associations with scores for children in middle income families, but not for those in low or high income families, was found here in relation to playing a musical instrument, and singing in a choir, with scores on the competency measures of Individual Responsibility, Social Skills with Adults, and the PAT Reading Comprehension test.

Busy Children?

Thirty percent of the children participated in music, had lessons outside school, and belonged to an organisation. Thirty-three percent were involved in two of these three activities, and 30 percent in one. Only 8 percent of children did not participate in any of these activities. Out-of-school activities offer additional learning opportunities to children, and give them the chance to engage with other adults and children, some coming from walks of life different from than their own.

Children who belonged to clubs were also more likely to have access to a computer (19 percent did not, compared with 29 percent of those who did not belong to clubs), and their parents had higher aspirations for their education (57 percent wanted their children to have a tertiary education, compared with 39 percent of those whose children did not belong to clubs). This pattern was also evident in relation to participation in lessons outside school.

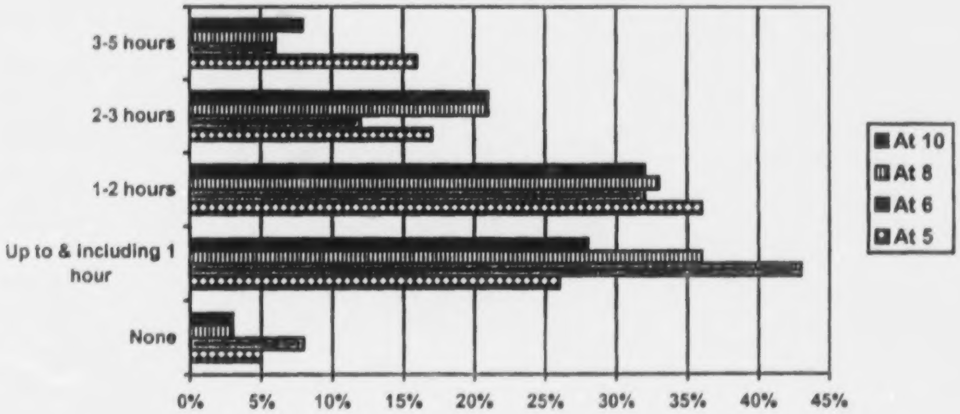
Television Watching

The study children watched television for an average of 2.65 hours a day at age 5, and for 1.26 hours a day at age 6. At age 8, the average viewing time crept up to 1.88 hours a day. By age 10, the study children spent around 2.20 hours a day watching television. Parental interviews took place throughout a one-year period, so this average viewing time takes some account of likely summer and winter variations.

Not all children watch television during the week. Twelve percent of parents reported that their children watched television on weekends only, when the viewing times tended to be in excess of 4 hours. Two percent of children were restricted to viewing on certain days only.

Figure 5

Children's Daily TV Watching



The NZ On Air 1997 survey put the average for New Zealand children's television viewing between the ages of 10 and 14 at 149 minutes per day.[70] The study children were watching on average 131 minutes. The NZ on Air 1997 survey also found that television viewing peaked between ages 10 and 14, and termed boys aged between 8 and 12 'the most dedicated young television viewers'.[71] However, we did not find any significant differences in the amount of television watched by the 10-year-old boys and girls in the Competent Children sample.

Previous Links between Children's Competency Levels and Their Television Watching

Lamb (1987) noted that New Zealand low achievers in the IEA writing study tended to watch more television than the high achievers. Caygill (1993) found that students in the 1990 IEA reading study who watched less television than others had higher scores for reading. Rogers (1994) found a negative correlation between the amount of time children spent watching television and their reading test scores, in a study of 125 Christchurch Form 1 students.

In the Competent Children project, children who watched a lot of television (more than 4 hours a day) at age 5 scored less for Mathematics. At age 6, there were no clear patterns linking children's competency levels and the amount of television they watched. At age 8, current viewing levels were associated with Mathematics and literacy scores, after allowing for family income. Earlier television watching habits also showed links with children's competency levels, with children who watched for more than 3 hours a day on average having lower scores for the Mathematics and literacy measures. There were no associations evident with the programmes children identified as their favourites.

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[70] NZ On Air (1997), *Literature review: children's viewing behaviour*. Wellington: NZ on Air, p. 69.

[71] ibid, p. 70.

Parental time spent watching television also showed associations with children's competency levels for Mathematics and the PAT Reading Comprehension test. Children from low income families whose parents watched television for less than an hour a day had average scores as high as their peers from high income families for Mathematics and Logical Problem-Solving.

Children's Competency Levels at Age 10 and Their Television Watching

We analysed children's competency levels at age 10 in relation to their previous television watching at ages 5, 6, and 8, and their current watching at age 10, and in relation to their parents' television watching at ages 8 and 10.

We found that children's previous patterns of television watching were only slightly less associated than their current pattern with their competency levels at age 10. The competencies most affected were Mathematics and literacy, with children who watched for more than 2 hours a day at age 5 and 6 tending to have lower scores than others. The group who watched for more than 3 hours a day also scored lower on the composite social and attitudinal competency.

These associations remained after taking family income into account, but were considerably diluted after taking maternal qualification into account. This is because maternal qualification and the amount of television watched by children are highly related. In the statistical analysis, they are confounding factors, that is, each represents some of the same information. Forty-two percent of the children whose mothers had a university qualification watched television for less than an hour a day on average, falling to 19 percent of those whose mothers had no qualification. Conversely, the latter children were more likely to watch for more than 3 hours on an average day: 20 percent, compared with 8 percent of those whose mothers had mid-senior school or tertiary qualifications, and 3 percent of those whose mothers had university qualifications.

Table 86 summarises the associations between television watching amounts at different ages, and children's competency levels at age 10.

Table 86

TV watching—Summary of Associations

TV watching factors	Curiosity	Perseverance	Individual Responsibility	Social Skills Peers	Social Skills Adults	Communication	Mathematics	Fine Motor Skills	PAT	Burt	Writing	Reading Age	Logical Problem Solving	Composite	Cognitive Composite	Social Composite
TV watching at age 5				◆ FM	◆ FM		◆ FM		◆ FM	◆ FM	◆ FM	◆ FM		◆ FM	◆ FM	
TV watching at age 6				◆ FM			◆ F iF M		◆F iF M	◆ F iF M		◆ F iF M	◆ F iF	◆ FM	◆ F iF M	◆ FM
TV watching at age 8	◆ FM	◆ FM	◆ FM		◆ FM	◆ FM	◆ FM		◆ FM	◆ FM	◆ FM	◆ FM	◆ FM	◆ FM	◆ FM	◆ FM
TV watching at age 10						◆ FM	◆ FM		◆ FM	◆ FM	◆ FM	◆ FM		◆ FM	◆ FM	
Parental TV watching at age 8				◆ F M •			◆ F M •		◆ F M •	◆ F M •		◆ FM	◆ F	◆ F	◆ F M •	
Parental TV watching at age 10					iF	◆ F •	◆ F		◆ F	◆ F		◆ FM	◆ FM	◆ F	◆ F M •	

In the cases indicated with • the residual effect was relatively weak but still notable.

◆ = association; M= association remains after taking maternal qualification into account; F= association remains after taking family income into account; i = interaction.

Television watching at age 8 shows more marked associations with children's competency levels at age 10 than their current television watching patterns do. Children who did not watch television every day at age 8 had the highest scores for PAT Reading Comprehension at age 10, and, together with children who watched for less than an hour a day at age 8, the highest scores for the other literacy measures, Mathematics, Communication, Perseverance, and Social Skills with Adults. These associations remained after taking family income into account. The associations with Mathematics and the PAT Reading Comprehension test remained after taking maternal qualification into account, while the associations with other competencies were diminished.

Table 87

Child TV Watching at Age 8 and Children's Competencies at Age 10

Child television watching at age 8→ Age 10 Competency↓	none *mean* n=16	up to 1 hour *mean* n=181	1–(2) hours *mean* n=166	2–(3) hours *mean* n=108	>3 hours *mean* n=30	Probability of F-value from anova	Percent variance accounted for
Curiosity	**69.5**	67.0	63.4	61.5	55.8	0.005	3.0
Perseverance	**77.0**	74.1	69.4	64.7	65.0	0.0004	4.0
Individual Responsibility	**72.2**	71.0	69.1	62.8	64.3	0.005	3.0
Social Skills with Adults*	**81.2**	77.7	74.9	71.2	69.8	0.004	3.1
Communication*	**76.6**	73.3	71.4	66.7	64.8	0.0006	3.9
Mathematics	**75.9**	66.7	62.8	57.0	56.7	0.0005	3.9
Literacy —PAT Reading Comprehension	66.8^	54.0^	47.0^^	43.1^^	42.2	0.000001	6.6
Literacy—Burt Word Reading	**71.0**	67.5	64.6	61.0	56.8	0.001	6.6
Literacy —writing*	70.8	**73.8**	· 69.0^	71.5	66.2	0.001	3.5
Literacy —reading age	**12yr5mth**	11yr8mth	11yr3mth	10yr9mth	10yr7mth	0.00002	5.3
Logical Problem-Solving*	**69.7**	63.6	60.7	57.8	58.9	0.0007	3.8
Composite Competency*	**75.8**	71.4	68.6	65.7	63.7	0.0000005	6.9
Composite Cognitive Competency*	73.1	66.3	62.4	60.4	57.8	0.000005	5.9
Composite Social & Attitudinal Competency*	74.5	72.1	69.5	65.8	64.2	0.00008	4.7

* In these cases the squared model was a better fit. ^ one fewer in this mean, ^^ two fewer in this mean, ^^^ three fewer in this mean, etc. The highest scores for each competency are in **bold type**.

Current television watching habits show associations with Mathematics and the literacy measures, but not with the other competencies. As at age 8, children who watched no television, or less than an hour a day, had higher scores. After fitting family income into the model, the associations with children's television watching remained, and there were also differences between the group who watched no television, and those who watched less than an hour a day. The associations also remained after fitting maternal qualification, but without any new differences emerging.

If the amount of earlier television watching is maintained, it can affect children's scores at age 10, at both ends of the spectrum. The average PAT Reading Comprehension score for children who watched for more than 2 hours a day at both ages 8 and 10 was 40 percent, compared with 44 percent for children who watched for more than 2 hours a day at age 10, but less than this at age 8; 49 percent for children who had watched more than 2 hours a day at age 8, but less than this at age 10; and 53 percent for the children who watched for less than 2 hours a day at both ages.[72]

Thus television watching has a marked bearing on children's competency levels in the core academic areas. If we look at it in the light of children's other activities outside school, a likely hypothesis for the negative impact is that television watching yields less of the kind of stimulus or uses of language and symbols which are available to children in other activities.

At age 10, children who belonged to clubs watched television just as much as those who did not. But only 24 percent of the children who watched for more than 3 hours a day had lessons outside school, increasing to 45 percent of the children who watched for 1 to 3 hours, and 63 percent of those who watched for less than an hour a day, or not at all. Similarly, only 20 percent of the children watching for 3 hours or more a day played a musical instrument, increasing to 29 percent of those who watched for between 1 and 3 hours, and 52 percent of those who watched for less than an hour a day, or not at all.

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[72] A regression model of these four 'levels' of television watching shows a significant slope of 4.2 (s.e. =0.8, p=0.0000007).

Children's television watching was linked with parental views of their enjoyment of reading: only 13 percent of those who watched for up to 2 hours a day were reported by their parents not to enjoy reading, compared with 25 percent of those who watched for more than 2 hours a day. But there were no links with enjoyment of Mathematics activities, or writing.

Children who had a computer at home were also somewhat less likely to watch television for more than two hours a day: 27 percent, compared with 41 percent of those who did not have a computer at home.

It is worth noting that children's access to computers, and perhaps a more actively engaging experience than television, was related to maternal qualification. Fifty-nine percent of the children whose mothers had no qualification said they had a computer at home, rising to 96 percent of the children whose mothers were university-educated.

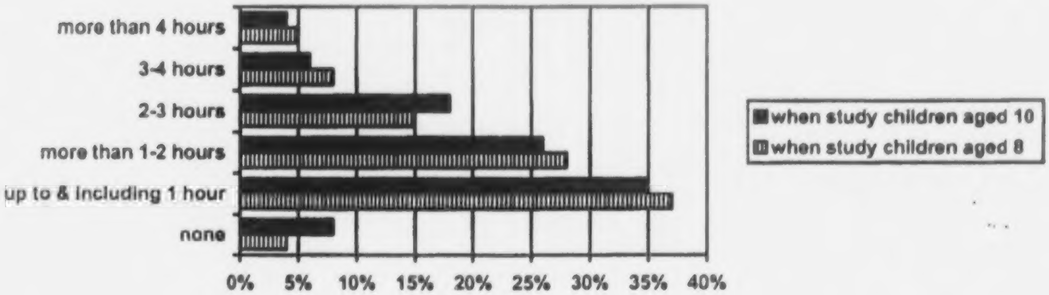
Parental Television Watching

The amount of time parents spent watching television also had some bearing on their children's television watching. Forty-nine percent of the children who watched television for up to an hour a day on average had parents whose own viewing was also limited to an hour, and 42 percent of the children who watched television for more than 3 hours a day had parents who did the same.

Figure 6 shows the average amount of daily television watching reported by the parents who were interviewed.

Figure 6

Parents' Average Daily Time Spent Watching Television



As with children, maternal qualification levels are linked to television watching. Sixty-one percent of the university-educated mothers watched for less than an hour a day, falling to 23 percent of mothers with no qualifications. A quarter of the latter watched for three hours or more a day, falling to 2 percent of university-educated mothers.

Parental television watching at age 8 was associated with children's competency levels at age 10 for Mathematics and the reading measures, but not writing, and also for Logical Problem-Solving. Children's Mathematics scores were lower if their parents had watched television for more than 3 hours a day when the children were 8. Children whose parents had watched no television every day had higher scores for the PAT Reading Comprehension test; those whose parents had watched for more than 3 hours tended to have lower scores on the PAT Reading Comprehension test, the Burt Word Reading test, reading age, and Logical Problem-Solving. These associations remained after including family income in the model. Maternal qualification and parental television watching are confounding factors.

Current parental television viewing also showed similar patterns, though including family income levels in the model did dilute the strength of the associations for Burt Word Reading, reading age, and Logical Problem-Solving. However, the associations did remain, in contrast to the effect of allowing for maternal qualification.

Children's Favourite Television Programmes

We asked the children for their three favourite programmes. The NZ On Air 1997 survey found that children aged 10–14 were dedicated TV2 viewers.[73] We also found that TV2 programmes dominated the study children's viewing. At age 10, the study children retained their strong preference for animated programming, much of it shown in the after school slot. The study children were also tending towards watching more programmes in prime time, particularly American situation comedies, such as *Friends* and *Home Improvement*, and animated programmes directed at adults as well as children, such as the highly popular *Simpsons* (classified here as an adult cartoon).[74] Few mentioned the news, documentaries, or sports programmes among their three favourite television programmes—though that could be because these were not regarded as 'programmes', with unique titles.

Table 88

Children's Three Favourite TV Programmes at Ages 8 and 10

Programme	At age 8 (n=523) %	At age 10 (n=507) %
Cartoons—unspecified/adult	52	60
Cartoons—children's adventure/sci-fi	31	41
Cartoons—children's/family viewing	57	36
Adult sitcoms/family viewing	22	33
Adult soap operas	14	23
Children's programmes (made for TV)	9	11
Adult/family entertainment	8	9
News/documentaries/dramas/wildlife	7	8
Adult adventure/sci-fi/crime/mystery/horror	7	8
Sports and sports related	4	6
Movies/videos children's family viewing	8	4
Children's adventure/sci-fi/horror unspecified	9	4
Movies/videos unspecified	2	2
Adult drama	–	2
Adult movies	6	1
None	2	1

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[73] NZ On Air (1997), p. 85.

[74] The NZ on Air 1997 survey also noted children aged 10-14 switching to prime-time programmes (p. 85).

Children who did not watch television at home, but somewhere else, were more likely to have no particular favourite programmes, and to mention videos. They were less likely than those who watched television at home to mention cartoons and adult soap operas, but just as likely to mention sitcoms.

Boys had a greater liking for children's adventure/science fiction cartoons than girls did (53 percent, compared with 27 percent), and for adventure/science fiction/crime and mystery programmes (12 percent, compared with 4 percent). They also had a greater liking for sport and sport related programmes (10 percent, compared with 1 percent) and for adult cartoons such as the *Simpsons* (65 percent, compared with 54 percent). Girls had decided preferences for soap operas (35 percent, compared with 12 percent) and for sitcoms (46 percent, compared with 22 percent). Girls were somewhat more likely to watch children's programmes made for television (14 percent, compared with 9 percent of boys).

Maternal qualification levels made no difference to children's television preferences.

Children attending decile 1–2 schools were half as likely as others to mention sitcoms (17 percent, compared with 35 percent), but four times as likely to mention sport (20 percent, compared with 5 percent).[75]

Interestingly, these differences do not emerge when analysing children's responses in terms of their family income. A preference for sports programmes is related to family income, with 8 percent of middle and high income children, but no low income children, nominating sports as one of their three favourite programmes.

Computer Use at Home

Eighty percent of the study families had a computer at age 10, compared with 71 percent at age 8, and 57 percent at age 6. Surprisingly, family income made no difference to computer ownership now, compared with when the study children were younger. However, maternal qualification levels were associated with family computer ownership: only 55 percent of the families where the mother had no qualification owned a computer, rising to 93 percent of those where the mother had a university qualification.

Parents and children had slightly different views on whether they had a computer at home. Eighty-two percent of children agreed with their parents that they had a computer at home. Seventeen percent of children said they had a computer at home when their parents said they did not, and vice versa. Part of this discrepancy may be attributed to the different timing of the two sets of interviews. Another explanation may be that the computer was inoperable at the time we spoke to the parent or their child. Some of the explanations we received for this will sound familiar—'My brother took it apart and can't get it back together again'; 'I was learning to programme it. That's what broke it.' In some cases the children had regular access to a computer at the home of their non-resident parent or relative. Five percent of the parents who said that they did not have a computer indicated that the child had regular access to a computer other than at school.

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[75] This difference does not seem attributable to the higher proportion of boys in decile 1–2 schools, since only 3 percent of children from decile 7–8 schools, which had a similar proportion of boys, mentioned sport.

We asked the children what they did on the computer at home, and we asked the parents what they did together with their child on the computer. Among families with a computer, only 10 children (2 percent) said that they made no use of it.

The next table compares children's reports of their home computer activities and parents' reports of shared activities. In addition to the activities reported below, a small number of children were using the computer to send faxes and scan documents, to watch movies or listen to music.

Table 89

Parents' and Children's Shared Computer Activities and Children's Computer Use

Activity	Shared (parent report) (n=402) %	Children (children's report) (n=402) %
Play games	45	87
Word processing	24	45
General technical support	24	–
Use CD Roms for information/project	22	23
Internet	19	21
Homework/project	18	31
Graphics	18	25
Use e-mail	4	4
Child helps adults/siblings	3	–
Interactive learning CD Roms	2	–
Write programmes	1	2
Nothing	1	2
Fax	0	0
Desktop publishing	–	9
Educational games	–	18

Fourteen percent of the children mentioned one kind of computer activity, 23 percent mentioned two, 26 percent mentioned three, 10 percent mentioned four, 5 percent mentioned five, and 2 percent, between six and eight activities. Twenty-four percent of the parents mentioned one computer activity shared with their child, 20 percent two, 11 percent three, 7 percent four, and 3 percent, between six and seven shared computer activities.

Parental involvement with the study children's computer activities had lessened by the time the children were aged 10: from 81 percent of parents in households with a computer saying that they spent some time with their child at the computer at age 8, to 66 percent at age 10. Perhaps reflecting children's increasing keyboard skills, parental technical support dropped from 42 percent at age 8 to 24 percent at age 10.

However, the computer activities reported by children were those more likely to be shared with their parents. Playing games with the children was the most frequent activity shared by parents and children at both ages 8 and 10 (41 percent at age 8 and 45 percent at age 10).

Twenty-four percent of parents did word processing with their children, compared with 16 percent at age 8. Around twice as many used CD Roms for children's projects (22 percent at age 10, compared with 11 percent at age 8), used graphics (18 percent at age 10, compared with 7 percent at age 8) or did homework on the computer with their child (18 percent at age 10, compared with 10 percent at age 8).

Children's use of the internet increased ten-fold between ages 8 and 10, from 2 percent to 21 percent. This increase may reflect children's development in writing, their interest in what is available on the internet, or the internet's own rapid growth and ease of access over this period.

Looking at the use children made of the computer, we found that there were some differences between boys' and girls' reported uses. Boys were more likely to mention playing computer games (90 percent, compared with 82 percent of girls). Girls were more likely to do word processing (53 percent, compared with 38 percent of boys), and to use graphics (30 percent, compared with 21 percent of boys).

Family income showed no differences in computer use; maternal qualification levels did. Children whose mothers had no qualification were least likely to use graphics (8 percent, rising to 26 percent of children with university-educated mothers), use e-mail, use it for homework or projects (13 percent, rising to 38 percent of children of university-educated mothers), or use the internet (5 percent, rising to 26 percent of children of university-educated mothers).

Parents were more inclined to play games on the computer with boys (50 percent) than with girls (36 percent), reflecting perhaps the gender preferences for games reported earlier.

Computer Use and Children's Competency Levels at Age 10

In previous phases of the Competent Children project, we found that children whose families had owned a computer when they were 5 scored more highly than others for Mathematics, the PAT Reading Comprehension test, and Logical Problem-Solving. At age 8, current computer access and use made a larger difference in scores than at age 5.

Family Computer Ownership at Age 5

Children whose families had owned a computer at age 5 continued to show higher scores for Mathematics, the PAT Reading Comprehension test, Logical Problem-Solving, and some of the social and attitudinal competency measures. Early exposure to computers, however, does not appear to give children an advantage for Fine Motor Skills.

Table 90

Family Computer Ownership at Age 5 and Children's Competencies at Age 10

Family Computer Ownership at age 5→ Age 10 Competency↓	Yes *mean* n=133	No *mean* n=141	Probability of F-value from anova	Percent variance accounted for
Curiosity	65.0	60.7	0.048	1.4
Social Skills with Adults*	76.5	72.2	0.046	1.5
Communication*	73.2	67.7	**0.006**	**2.8**
Mathematics	67.6	58.4	**0.0006**	**4.2**
Literacy —PAT Reading Comprehension	53.5^	44.7^^^	**0.001**	**4.0**
Literacy —Burt Word Reading	66.4	62.2	0.053	1.4
Literacy —reading age	11yr9mth	11yr2mth	0.02	1.9
Logical Problem-Solving*	63.7	59.3	0.014	2.2
Composite Competency*	70.5^	66.9^^^^	**0.009**	**2.5**
Composite Cognitive Competency*	66.0^	60.9^^^^	**0.004**	**3.1**
Composite Social & Attitudinal Competency*	70.7	67.3	0.045	1.5

* In these cases the squared model was a better fit. ^ one fewer in this mean, ^^ two fewer in this mean, ^^^ three fewer in this mean, etc. The highest scores for each competency are in bold type.

These associations remained, but the size of the percentage point difference was reduced, after taking family income into account. However, when accounting for maternal qualification first, the associations were no longer evident. This is consistent with the greater likelihood of families with high educational levels owning computers when the study children were aged 5.

Age 8 Computer Ownership

A few more associations were evident between children's competencies at age 10, and their family ownership of a computer at age 8, than at age 5. This is probably linked to children's ability to make more use of a computer when they can read and write. Only the cognitive competencies remained associated after taking family income and maternal qualification into account.

Table 91

Family Computer Ownership at Age 8 and Children's Competencies at Age 10

Age 8 family computer ownership→ Competency at age 10↓	Yes *mean* n=360	No *mean* n=145	Probability of F-value from anova	Percent variance acct. for
Perseverance	**71.7**	66.2	**0.005**	**1.6**
Social Skills with Peers*	69.5	67.0	0.031	0.9
Social Skills with Adults*	**76.6**	71.7	**0.005**	**1.6**
Communication*	**72.7**	66.6	**0.00006**	**3.2**
Mathematics	**66.8**	53.6	**0.000000002**	**7.0**
Literacy —PAT Reading Comprehension	**52.1^^**	41.2^^^^	**0.0000002**	**5.2**
Literacy —Burt Word Reading	**66.6**	59.5	**0.00002**	**3.5**
Literacy —writing*	**72.1^**	68.4	**0.0013**	**2.0**
Literacy —reading age	**11yr7mth**	10yr9mth	**0.00001**	**3.7**
Logical Problem-Solving*	**63.4**	56.1	**0.00000005**	**5.8**
Composite Competency*	**70.4^^^**	65.3^^^^	**0.0000005**	**4.9**
Composite Cognitive Competency*	**65.7^^^**	57.8^^^^	**0.0000000007**	**7.4**
Composite Social & Attitudinal Competency*	**70.7**	66.6	**0.001**	**2.1**

* In these cases the squared model was a better fit. ** the square root of the competency was used in this model.
^ one fewer in this mean. The highest scores for each competency are in **bold** type.

Age 10 Computer Ownership

Current family computer ownership is associated with similar differences in children's age 10 scores as family computer ownership two years earlier, for all the competencies other than Fine Motor Skills and Curiosity. Unlike computer ownership at ages 5 and 8, these differences *did* remain, somewhat reduced, after taking family income and maternal qualification into account.

Table 92

Family Computer Ownership and Children's Competencies at Age 10

Age 10 family computer ownership→ Competency at age 10↓	Yes *mean* n=402	No *mean* n=105	Probability of F-value from anova	Percent variance acct. for
Perseverance	71.7	63.9	0.0003	2.6
Individual Responsibility	69.6	63.0	0.002	1.9
Social Skills with Peers*	69.6	65.3	0.001	2.1
Social Skills with Adults*	76.3	70.8	0.004	1.7
Communication*	72.2	65.8	0.0001	2.9
Mathematics	66.3	50.5	0.0000000001	7.9
Literacy —PAT Reading Comprehension	51.7^^^	38.5^^^	0.00000002	6.1
Literacy —Burt Word Reading	66.3	58.1	0.00001	3.7
Literacy —writing*	72.0^	67.4	0.0005	2.3
Literacy —reading age	11yr7mth	10yr6mth	0.0000004	4.9
Logical Problem-Solving*	63.2	53.9	0.0000000005	7.4
Composite Competency*	70.3^^^^	63.6^^^	0.000000008	6.5
Composite Cognitive Competency*	65.4^^^^	55.5^^^	0.0000000000	8.8
Composite Social & Attitudinal Competency*	70.6	65.2	0.0002	2.8

* In these cases the squared model was a better fit. ** the square root of the competency was used in this model.
^ one fewer in this mean. The highest scores for each competency are in **bold** type.

Particular Computer Activities

In exploring the associations between children's computer use and their competency levels at age 10, we used parental reports of children's computer use at age 8, and children's reports at age 10 (at age 10 we asked parents about the help they gave their children on the computer, but not how the children were using the computer).

Table 93, below, shows the activities which were most associated with children's competency levels at age 10. Not all of these associations were positive: particular computer uses were sometimes linked with lower rather than higher scores for social and attitudinal competency measures. These cases are marked with a —.

On the whole, the associations between particular uses of the computer and children's competencies are much less marked than the more global indicator of computer use, family computer ownership. Parental reports of use show more associations than do children's reports. This may be because they refer to earlier and therefore longer use; or it may be that parents and children saw their computer use differently. Word processing, the use of graphics, and the use of CD Roms are the activities that are linked with higher scores for children. Graphics usually involve some decisions about the purpose of the display, and the fit between the data and the forms available on software. This involves some thought as well as knowledge. The use of CD Roms probably indicates and also encourages exploratory habits, including perseverance. Games appear to do little for children, though at age 10 they are associated with Fine Motor Skills – as are other aspects of computer use.

Given that family computer ownership at ages 8 and 10 was linked to higher scores for children across the board, it is perhaps puzzling that we could not find more associations, though the associations we find make some sense. But we can provide only a partial picture of children's computer use; we do not have information about time on computer with each activity, or use of computers at school.

Table 93

Computer Use at Ages 8 and 10—Summary of Associations

Computer use factors	Curiosity	Perseverance	Individual Responsibility	Social Skills Peers	Social Skills Adults	Communication	Mathematics	Fine Motor Skills	PAT	Burt	Writing	Reading Age	Logical Problem Solving
Age 8 – parent report													
Age 8 played games		— F,M	—		♦ F,M								
Age 8 played educational games													
Age 8 word processed			♦ F		♦ F	♦ F,M	♦ F,M		♦ F,M	♦ F,M	♦ F,M	♦ F,M	
Age 8 used graphics		♦ F,M	♦ F,M	♦ F,M		♦ F,M	♦ F,M	♦	♦ F,M	♦ F,M	♦ F	♦ F,M	♦ F,M
Age 8 used CD Roms	♦ F,M	♦ F,M	♦ F,M	♦ F,M				♦ F,M	♦ M		♦ F,M	♦	♦ F,M
Age 8 used computer for homework/projects							♦						
Age 10 – child report													
Age 10 plays games		— F											
Age 10 plays educational games								♦ F,M					
Age 10 word processes		♦ F									♦ F		
Age 10 uses graphics										♦ F		♦ F,M	
Age 10 uses CD Roms	♦ F,M	♦ F,M						♦ F,M					
Age 10 uses computer for homework								♦ F,M					
Age 10 uses computer for desktop publishing													
Age 10 uses internet									♦			♦ F,M	

♦ = association; M= association remains after taking maternal qualification into account, F= association remains after taking family income into account.

Summary

At age 10, most of the study children were involved in structured activities outside school as well as within it. Most children also continued to enjoy informal physical play and play with their friends outside school. Children whose structured activities outside school involved music or drama had higher average scores than others.

The children in the study were also likely to be using a computer at home, and doing more things on their own on the computer, than they had before. Children who had computers at home scored higher than other children for most competencies at age 10. Earlier family computer ownership did not show marked associations after taking maternal qualification into account. Word processing, the use of graphics on computers, and the use of CD Roms at age 8 were associated with higher scores for children at age 10. Playing games on the computer at age 8 was not associated with higher scores at age 10, other than for Social Skills with Adults; playing games at age 10 was associated with higher scores for Fine Motor Skills.

Few children did not watch television, and more were watching some of the same programmes as their parents. Children who were watching more than two hours television a day had lower scores on average. The amount of television watched in earlier years also had a bearing on children's current competency levels, as well as the amount of television they watched at age 10. Parental television watching also had a bearing on the amount of television watched by their children. Children who watched more television than others were less likely to enjoy reading, and to take part in other out of school activities. It appears that television may displace other activities which provide children with opportunities to use language and symbols.

The two most striking factors which made a difference for children's and parents' leisure activities were gender and maternal qualification. Traditional interests associated with masculinity and femininity continue: boys engage more in physical action and combat (including video games), girls in the arts. Yet it is the performing arts, which bring together language and action, discipline and imagination, particularly the act of putting oneself in another's shoes, which benefit children, irrespective of gender.

Children whose mothers have no formal qualifications do experience less of the language-enriching and role-playing activities that others enjoy—but more television. Their parents also rely on television for restoration and ease more than others do. Unfortunately, television can be a false friend, shutting out other activities, including reading, and interactions which are more stimulating, for both children and their parents.

> Within each country, the pattern is the same: those with higher levels of education are, on average, more often engaged in reading books and writing letters. The amount of television watched is negatively related to the respondents' level of education. Results of a more detailed analysis of data indicated that respondents' prose literacy scores are positively related to their daily reading practices, and negatively related to the amount of television they watch, even after taking into account their age and level of education. (OECD & Human Resources Canada, 1997, reporting on the International Adult Literacy Survey, p. 77).

9 HOMEWORK, LITERACY AND MATHEMATICS ACTIVITIES AT HOME

In this chapter we look at children's experiences at home that might more directly complement and support their learning at school. We describe the children's engagement in homework, reading, writing, and Mathematics activities at home. We also describe parents' (mainly mothers') reading preferences.

Homework

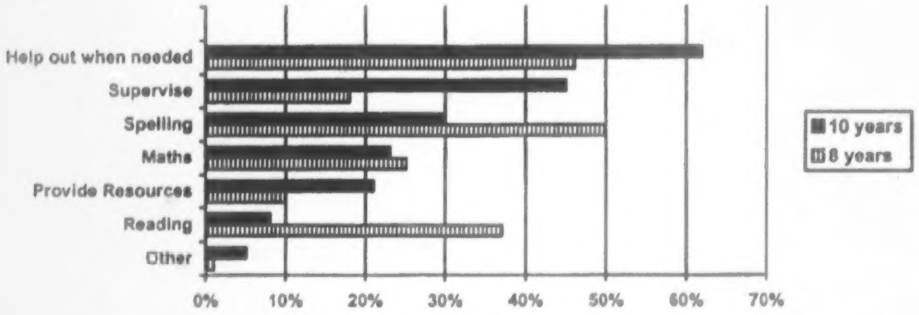
All the children in the study said that they had homework to do. Ninety-one percent were given homework regularly. Only 8 percent of these children said that their families never or only infrequently made sure that they did their homework. All but 2 percent of their parents said that they lent a hand with their child's homework. There were no differences related to family income, maternal qualification, ethnicity, or family type.

At age 10, parental help with homework was less likely than at age 8 to be linked to specific skills such as spelling and reading. As children grew more proficient in reading, this kind of help was probably less needed. Parents were more likely to respond to student initiated requests for help, to supervise, and to provide resources, indicating an increase in projects as homework. Two percent of the parents of children at age 10 said that they would do the homework for the child.

Mothers who had no qualifications were less likely to supervise (39 percent, rising to 55 percent of university-qualified mothers), or to provide resources (13 percent, rising to 28 percent of university-qualified mothers).

Figure 7

Parental Assistance with Children's Homework



Teachers reported that 72 percent of the study children always did their homework, 21 percent did it sometimes, but not always, and 7 percent did no homework. Family income levels were unrelated to teacher reports of children doing their homework. Children from one-parent families which had been two-parent families were more likely than others to do no homework (13 percent).

Homework completion was linked to teachers' assessments of children's overall achievement levels: 88 percent of those seen as having a very good or excellent achievement level always did their homework, compared with 60 percent of those seen as achieving at an average or medium level, and 52 percent of those achieving below average.

Homework and Children's Competency Scores

Children whose teachers said they always did their homework had higher scores for all the competency measures. Children whose homework completion was variable scored higher than those who never did their homework for most of the social and attitudinal competencies, Mathematics, and Logical Problem-Solving—but not the Literacy measures.

Table 94

Homework Completion and Children's Competencies at Age 10

Homework Completion→ Age 10 Competency↓	Yes *mean* n=364	Varies *mean* n=108	No *mean* n=33	Prob. of F-value from anova	Percent variance acct. for
Curiosity	**66.1**	59.8	53.5	0.00001	4.4
Perseverance	**75.1**	60.1	48.5	0	18.3
Individual Responsibility	**73.3**	58.6	44.8	0	20.5
*Social Skills with Peers**	**70.8**	65.7	56.9	0.00000000005	9.0
*Social Skills with Adults**	**78.2**	69.4	60.8	0.0000000002	8.4
*Communication**	**73.8**	65.3	57.6	0.0000000005	8.2
Mathematics	**66.0**	57.8	47.3	0.0000006	5.5
Fine Motor Skills*	**87.4**	83.4	81.1	0.0004	3.0
Literacy —PAT Reading Comprehension	**51.5^^**	44.4^^^	36.6	0.00003	4.1
Literacy —Burt Word Reading	**66.6**	60.6	56.7	0.0002	3.4
Literacy —writing*	**72.7**	66.6	67.3^	0.00002	4.3
Literacy —reading age	**11yr7mth**	10yr10mth	10yr9mth	0.002	2.5
*Logical Problem-Solving**	**63.0**	58.6	52.0	0.000007	4.6
Composite Competency*	**71.5^^**	64.1^^^	56.0^	0	16.3
Composite Cognitive Competency*	**65.4^^**	59.7^^^	53.0^	0.00000006	6.5
Composite Social & Attitudinal Competency*	**72.9**	63.1	53.7	0	16.8

* In these cases the squared model was a better fit ^ one fewer in this mean, ^^ two fewer in this mean, ^^^ three fewer in this mean, etc. The highest scores for each competency are in **bold** type.

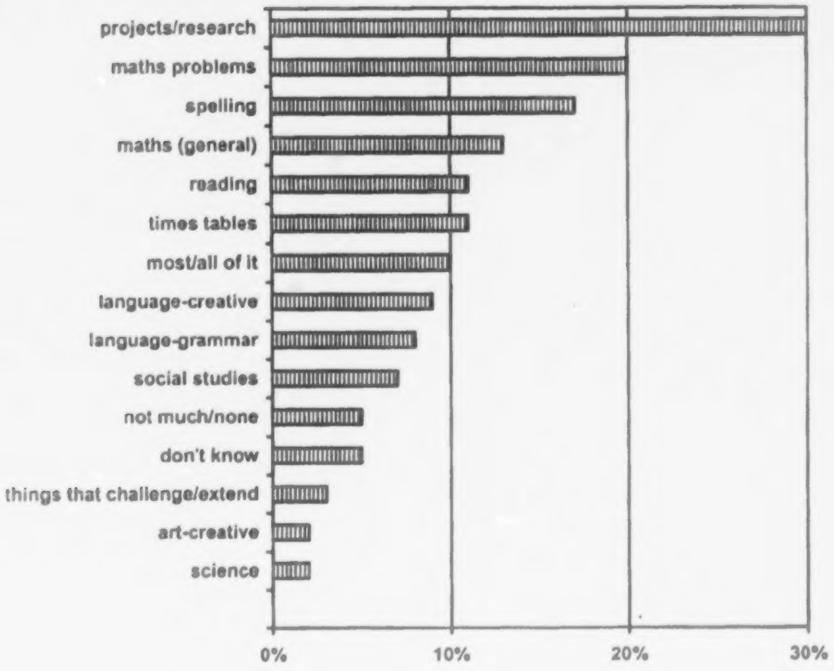
Doing homework consistently continued to remain positively associated with children's competency levels across the board after taking family income and maternal qualification separately into account. This seems common-sense: if homework is well-set, it allows children to extend their practice and understanding, and it certainly requires self-discipline. Homework is also regarded by many parents as an essential part of learning. It is not clear from our data whether some initial confidence in their own knowledge and skills is needed for children to apply themselves consistently to homework, but the analysis does suggest that a downwards spiral can develop if work for school is understood to stop at the school gates.

Parents' and Children's Views of Homework

We asked parents what kind of homework benefited their child most. Parents gave a wide range of responses, but were most likely to see work which extended the child, such as projects and mathematical problems, as contributing value to the child's learning. A small proportion did not focus on particular subjects, but felt revision was beneficial (3 percent) or that children gained from the acquisition of self-management skills (2 percent).

Figure 8

Parents' Views of Most Valuable Homework

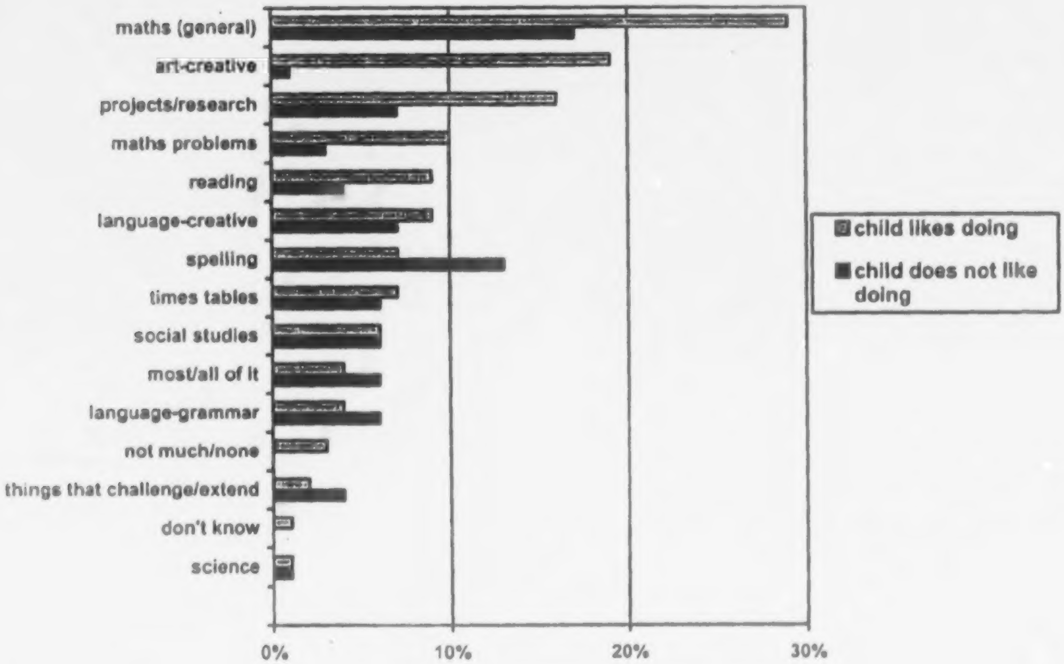


There were some interesting differences among parents. University-educated parents were less likely to see value in reading (7 percent, compared with 14 percent of those with no qualifications) reflecting the fact that more children whose mothers were university-qualified were reading at higher levels, and more likely to question whether homework had any value at all (13 percent, compared with none of the parents without qualifications). This could be seen as an indication of their own confidence. Mothers without qualifications were more likely to mention Mathematics (other than times-tables) as valuable homework (25 percent, compared with 10 percent of university-educated mothers). However, there were no differences related to maternal qualification in the children's views of their preferences and dislikes.

Figure 9 compares the study children's preferred and disliked homework. Mathematics and art or creative homework were the two kinds of homework most enjoyed by the children.

Figure 9

Children's Views of Homework



Parents reported that they were more likely to supervise boys than girls when the time came do their homework (51 percent for boys, compared with 38 percent of girls). However, there were no gender differences in children's perceptions of family insistence on the completion of homework.

Girls and boys had much the same preferences when we asked them what homework they liked doing best, and what they disliked, though there was a trend for girls to be more positive about reading and language, projects, and creative work involving art than boys were. Twenty-seven percent of the children said that they liked all homework, 52 percent liked some of it, and 21 percent did not like doing homework.

Children who liked all their homework were also more likely to talk to their parents about school often (91 percent, compared with 79 percent of those who liked some of their homework, and 66 percent of those who disliked homework).

Children who said they enjoyed doing all their homework were most likely to rate their home highly for giving them help when they needed it (70 percent, compared with 57 percent of those who enjoyed doing some of their homework, and 49 percent of those who did not enjoy homework). They also gave higher ratings for the item *my family asks me about school* (59 percent rated this at always, compared with 47 percent of those who enjoyed some homework, and 42 percent of those who enjoyed none). But children who did not enjoy homework gave similar ratings on these items of home support: *I get things explained to me if I don't know them*, and *my family makes sure I do my homework.*

Home Reading Activities

Parental Reports of Their Child's Reading at Home

We asked parents to tell us whether their child engaged in 12 specific reading activities at home. The next table shows an increase in parental reports of the study children's use of dictionaries and encyclopaedias between ages 8 and 10, a large increase in the proportion of children reading teenage magazines and books, and some increase in their reading of adult books.

Table 95

Parents' Reports of Children's Home Reading Activities at Ages 8 and 10

Reading Activity	Age 8 N=521 %	Age 10 N=504 %
Reads fiction	92	90
Reads books brought home from school for homework	88	89
Uses written instructions	83	88
Reads non-fiction	79	78
Uses a dictionary	55	77
Uses an encyclopaedia	55	70
Reads children's magazines	51	61
Reads adult magazines/newspaper	45	44
Reads comics/jokes	31	37
Reads teenage magazines	10	35
Reads teenage books	14	27
Reads adult books	9	13

Girls were twice as likely to be said to be reading teenage magazines (46 percent, compared with 24 percent of boys). Teenage books, use of a dictionary or instruction manuals were also more likely to be mentioned as daughters' reading material. Comics were the boys' forté (49 percent, compared with 23 percent of the girls).

Mothers with no qualifications themselves were less likely to mention use of encyclopaedias (58 percent). Teenage magazines were less mentioned by university-educated mothers (20 percent). The highest use of adult magazines or books was among children of tertiary-educated mothers, who include teachers (57 percent and 23 percent respectively).

Children's Reports of Their Reading at Home

Ninety-seven percent of the children said that they read books at home. Most of those who said that they did not read at home said that they simply didn't like reading or preferred doing something else. One child said reading was too hard and two children said that there were no books at home.

Children who said they did not read at home came from all income groups.

Our question to children about the kind of reading they did at home was open-ended, which may explain their much lower reporting than their parents of all kinds of reading material, other than fiction.

Table 96

Children's Report of Books Read at Age 10

	N=507 %
Fiction	87
Non fiction	20
Newspaper/magazine	19
Comics/joke books	16
Instruction books/manuals etc	9
Reading assigned for homework	9
Picture books	4
Encyclopaedias/dictionaries	3
Reading to younger children/dolls etc	2
Bible/religious/spiritual books	2
Other	2
Poetry	1

Forty-six percent of the children mentioned only one kind of reading material, 34 percent mentioned two kinds, 12 percent, three kinds, and 5 percent, four or five kinds of reading material. Boys were more likely to say that they read comic books (21 percent, compared with 10 percent of girls) and books and other reading material assigned as homework (11 percent, compared with 6 percent of girls). Ninety-five percent of girls said that they read fiction, compared with 80 percent of boys.

There were no differences in children's reports of their types of reading material at home related to maternal qualification, or to parental reading preferences.

We got higher proportions of children reading newspapers or magazines when we asked them directly about these.

Three-quarters of the children said that they read magazines or newspapers. Children reported reading a wide variety of publications covering special interests, sports, and comics through to teenage magazines and adult tabloids. The big discrepancy in parents' and children's reporting on the reading of children's magazines noted at age 8 still remains. Only 9 percent of children said they read children's magazines, but 61 percent of parents said their children read children's magazines.

Table 97

Children's Magazine and Newspaper Reading at Age 10

	N=505 %
Newspaper	31
Teenage magazines	15
Women's	12
Sports	11
TV guides	11
Children's	9
Weekly newspaper/magazine	8
Computer	7
Hobby	6
Children's pages in newspaper/magazines	5
Comics	4

Thirty-eight percent of the children mentioned one kind of periodical, 27 percent mentioned two, 8 percent mentioned three, and 2 percent mentioned four to seven kinds of periodical. Girls were more likely than boys to read magazines (79 percent, compared with 71 percent of boys). They had clear preferences for teenage magazines (30 percent, compared with 2 percent of boys), women's magazines (18 percent, compared with 6 percent of boys), and children's magazines (14 percent, compared with 5 percent of boys).

Boys had a decided preference for sports magazines (18 percent, compared with 3 percent of girls), and for computer magazines (12 percent, compared with 2 percent of girls). Hobby magazines also attracted more boys than girls (8 percent, compared with 3 percent).

Reading of magazines or newspapers was unrelated to family income or maternal qualification, other than a higher rate of reading women's magazines among children whose mothers had a mid-senior school qualification or no qualification (14 percent, compared with 7 percent of children with tertiary or university qualified mothers).

Children's Reading Preferences and their Competency Levels at Age 10

At age 8, we used children's reports of their reading, in response to an open-ended question, in our analysis of the relationships between reading material and children's competency levels. We found that children who mentioned fiction tended to have higher scores, and those who mentioned non-fiction had higher scores for Mathematics and reading. Children who mentioned only the reading assigned for homework scored lower than others for most of the competencies.

At age 10, we used parental responses to the list we asked about, rather than children's responses to an open-ended question. This allowed us to include reading material other than books. Using parental rather than children's reports, we found that fiction reading continued to have marked associations with most of the competencies, and non-fiction also showed a similar pattern. However, the associations with reading only homework were less marked, probably because we did not separate out the children who read only homework—and nothing else—as we had at age 8. Most children read homework at home, and so the distinction made here was between those who did and those who did not read homework.

Magazines and comics have little bearing on children's Mathematics and Literacy levels, though magazines have some associations with social skills. The use of reading to follow instructions is as marked as the reading of fiction. This kind of reading is applied, and would usually involve thinking about the use of the material, as well as comprehending it. Using an encyclopaedia is the third reading activity which has associations with most of the competencies.

The chart below gives the percentage point differences in competency scores between those who do a given activity, and those who do not, though they are likely to do other kinds of reading. An F indicates that the association did not remain after taking family income into account, and an M, that it did not remain after taking maternal qualification into account.

Table 98

Percentage Point Differences Between Children who Read Particular Material, and Those who do not Read Such Material

Reading material→ Competency↓	Homework set material	Fiction	Non-fiction	Uses dictionary	Uses encyclopaedia	Follows instructions	Children's mgazines	Teenage magazines	Adult magazines	Teenage books	Adult books	Comics
Curiosity	-	-	-	-	3.6M	-	-	-	-	-	-	-
Perseverance	-	10.4	-	5.1	8.8	**11.4**	-	-	-	-	-	-
Individual Responsibility	-	**13.4**	-	6.3	8.1	9.5	4.7	3.5F,M	-	4.01	-	-
Social Skills Peers	-	**6.4**	-	-	4.2	5.6	3.2	2.7	-	3.0	-	-
Social Skills Adults	-	8.4	-	-	5.8	**8.9**	-	3.5	-	3.9	-	-
Communication	-	**12.1**	3.5	6.1	7.2	**12.1**	2.7	-	-	6.8	-	-
Mathematics	-	16.4	8.3	9.2	12.9	**19.9**	-	-	-	9.0	6.2M	-
Fine Motor Skills	-	4.2	-	-	5.0	**6.6**	-	-	-	3.0	-	-
PAT Reading Comprehension	7.4	16.2	9.1	6.3	11.0	**16.3**	3.9	-	5.1	10.7	8.8	4.3
Burt Word Recognition	-	**12.7**	6.7	9.7	7.7	11.4	-	-	3.8	7.2	8.8	-
Writing	-	7.2	3.6	5.7	5.8	**9.5**	-	-	-	-	-	-
Reading age	-	2.6	1.6	1.6	2.2	**3.4**	1.0	-	0.9	2.2	1.8	0.8M
Logical Problem-Solving	-	8.0	2.5F,M	3.7	6.6	**12.1**	2.9	-	-	5.1	-	2.4M
Composite Competency	2.7	9.1	3.5	4.6	6.8	**9.4**	2.1	-	-	4.4	-	-
Composite Cognitive	-	10.3	5.5	5.7	8.3	**11.8**	2.3	-	2.7	5.8	4.1	-
Composite Social & Attitudinal	-	**8.8**	2.7F,M	4.5	6.3	8.6	2.4	-	-	3.9	-	-

Highest percentage point differences are in **bold** type.

In practically all cases, the associations remained after allowing for family income or for mother's education. There was one interesting interaction with family income: children in low income families who read teenage books did not have higher scores for the PAT Reading Comprehension and Burt Word Reading tests, or for writing, than their peers who did not, unlike children in middle and high income families. The same pattern did not exist in relation to maternal qualification; but children whose mothers had no qualification and those whose mothers had a trade qualification, and who read teenage books, did not have higher scores, unlike those with mothers with other qualifications.

Children's Enjoyment of Reading

At age 10, slightly fewer children were reported by their parents to enjoy reading than at age 8 (69 percent, compared with 76 percent). Seventeen percent of the children were now thought not to enjoy reading, a marked jump from 9 percent two years before. Only 56 percent of the boys were thought by their parents to enjoy reading, compared with 83 percent of the girls.

There were no differences in children's reported enjoyment of reading linked to maternal qualification or family income.

Children who were reported to enjoy reading or to enjoy it sometimes were more likely to read teenage books than those who did not enjoy reading (27 percent, compared with 2 percent), and to read adult books (12 percent, compared with 5 percent of those who did not enjoy reading). There were no other marked differences in reading patterns related to parental reports of children's enjoyment of reading.

Over two-thirds of the parents who thought their child enjoyed reading also thought that they enjoyed writing (68 percent). A similar proportion of those children who were thought not to enjoy reading were also thought not to enjoy writing. Children whose enjoyment of reading varied had more varied reports of their enjoyment of writing.

Children were more likely to enjoy reading if they watched television for less than two hours a day on average: only 13 percent of this group were thought by their parents not to enjoy reading, compared with 25 percent of those who watched for two hours or more a day on average.

We also looked at children's answers relating to school and the Curiosity measure and their enjoyment of reading, to see if this might explain what enjoyment of reading can provide children. Children who enjoyed reading did score higher for the item *takes an active interest in her/his surroundings*, but not for the other Curiosity items. But enjoyment of reading was not associated with seeing school more positively than others, other than that children who did not enjoy reading, were more likely to get tired of trying at school.

Enjoyment of Reading and Children's Competencies at Age 10

Current enjoyment of reading was associated with higher scores for all the competencies for children at age 8, and again at age 10. Most of the differences are between the scores of those whose parents thought they enjoyed reading, and those who did not enjoy it, or whose enjoyment varied. However, there was little difference in scores for Social Skills with Peers and Social Skills with Adults for those who enjoyed reading or whose enjoyment varied. These associations remained after taking family income and maternal qualification into account. As we shall see in Chapter 14, enjoyment of reading appears to be one of the key underlying factors in children's performance overall.

Do 10-Year-Olds Talk with Their Parents About Their Reading?

Almost two-thirds of the children who read at home (64 percent) said that they talked to their parents about what they were reading some or all of the time. A third did not talk to their parents about what they were reading. Parents' views of their child's enjoyment of reading were unrelated to children's reports that they talked to their parents about what they were reading.

Children who mentioned instruction books, manuals, or recipes, were slightly more likely to talk to their parents about their reading (73 percent).

Talking to parents about what children were reading was related to the use of public libraries: 21 percent of those who did not talk to their parents about what they were reading also did not visit a public library, compared with only 12 percent of those who did talk to their parents about what they read.

Children from high income families were more likely to talk to their parents about what they were reading (39 percent, compared with 29 percent of middle income and 25 percent of low income children), though in each income group there was a sizeable minority of children who did not discuss their reading with their parents: 28 percent of high income children, 37 percent of middle income children, and 42 percent of low income children.

There was no relationship between maternal qualification levels and children's reports that they talked to their parents about what they were reading.

Talking to Parents About Reading and Competency Levels at Age 10

Talking to parents about their reading was not associated with children's performance on the Literacy measures. The only associations were with Perseverance and Individual Responsibility, with children who did not talk to their parents about their reading at all scoring around 5 percentage points less than others. These associations remained after including maternal qualification in the model, but only the association with Perseverance remained after including family income.

Use of Public Libraries

Eight-three percent of the children said that they went to a library—the same as at age 8. Most of these children (89 percent) said that they visited the library with their parents or another family member, 7 percent took themselves and 2 percent went with their friends. Some also made school visits (13 percent). Boys were more likely to say that they went to the library with the school than girls were (14 percent, compared with 8 percent).

Overall, the number of children visiting a library at least once a month remained relatively constant between ages 8 and 10 (67 percent at age 8 and 69 percent at age 10). However, fewer children were visiting the library at least once a week. This may be because they were participating in more organised activities through clubs and lessons than at age 8; increased maternal employment may also make it more difficult for families to find time to take children to the library; given that most children were still dependent on their parents for transport. However, children could also read longer books, and needed less frequent stocking up.

Table 99

Visits to a Library—Children's Responses at Ages 8 and 10

	Visit to public library age 8 N=434 %	Visit to public library age 10 N=423 %
Irregular/do not know	33	29
One a week or more often	27	19
Once a fortnight	15	19
Once a month	16	18
Once every 3 weeks	9	13

Girls were more likely to say that they visited the library once every three weeks than boys were (14 percent, compared with 8 percent)

Children from low income homes were just as likely to go to the public library as others, and as frequently. However, only 67 percent of children whose mothers had no qualifications went to the public library, compared with 86 percent of others.

Frequency of library visits was not associated with reading of magazines or newspapers.

Public Library Use and Children's Competencies

In earlier reports we have noted the advantages for children of reading library books. Caygill (1993) also found these for Standard 3 and Form 4 students in the 1990 IEA reading study.[76] The benefits continued at age 10 for the Competent Children project study children.

Children who said they went to the public library had higher scores than those who said they did not for all the competencies except Individual Responsibility, Fine Motor Skills, and writing (though age 8 writing scores were associated with current public library use).

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[76] Manzo (2000) reports a study of school library quality and use in three US states which found that 'students in schools with appropriate and sufficient library collections and qualified library personnel tended to perform better on standardised tests, especially in reading'.

Table 100

Public Library Use and Children's Competencies at Age 10

Child goes to the Public Library→ Age 10 Competency↓	Yes *mean* n=422	No *mean* n=84	Probability of F-value from anova	Percent variance accounted for
Curiosity	64.7	60.5	0.053	0.7
Perseverance	70.9	66.3	0.051	0.8
Individual Responsibility	68.9	64.6	0.062	0.7
Social Skills with Peers*	69.3	65.5	**0.010**	1.3
Social Skills with Adults*	75.8	71.5	0.037	0.9
Communication*	71.9	66.1	**0.004**	1.6
Mathematics	64.7	54.8	**0.0002**	2.6
Literacy —PAT Reading Comprehension	50.8^^^^	39.9^^	**0.00002**	3.5
Literacy —Burt Word Reading	65.9	58.1	**0.0001**	2.8
Literacy —reading age	11yr6mth	10yr7mth	**0.00002**	3.5
Logical Problem-Solving*	62.1	57.0	**0.004**	1.6
Composite Competency*	69.7^^^^^	64.8^^	**0.0002**	2.7
Composite Cognitive Competency*	64.5^^^^^	58.0^^	**0.00006**	3.2
Composite Social & Attitudinal Competency*	70.3	65.8	**0.008**	1.4

* in these cases the squared model was a better fit. ^ one fewer in this mean, ^^ two fewer in this mean, ^^^ three fewer in this mean, etc. The highest scores for each competency are in **bold type**.

These associations remained after taking family income into account, but after including maternal qualification in the model, Social Skills with Peers, Social Skills with Adults, Communication, and Logical Problem-Solving no longer showed associations. At age 8, we had found interactions between competency scores and maternal qualification showing no advantage for children whose mothers either had no qualifications or tertiary or university qualifications. However, at age 10 we found none, indicating a positive association between children's library use and their competency scores irrespective of their mother's level of education.

In terms of frequency of library visits, we found that children who said they visited every three weeks had higher scores than others for the competencies other than Curiosity, Social Skills with Peers, Social Skills with Adults, writing, and Fine Motor Skills, and they scored much the same as those who went fortnightly for the literacy measures. Children whose visits to a public library were irregular tended to have lower scores.

The association with Social Skills with Peers was no longer evident after taking family income into account. All the associations remained after taking maternal qualification into account.

Parental Reading

Ninety percent of the parents interviewed said they liked to read themselves. Parental enjoyment of reading was markedly lower for those with no school qualifications: 72 percent.

Parents' own enjoyment of reading had no bearing on their views of whether their child liked reading. There was also no relationship between mother's preferred reading material and children's preferred reading material: those whose mothers preferred romantic fiction were just as likely as those whose mothers enjoyed non-fiction to read fiction and non-fiction.[77]

Table 101

Parents' Reading Preferences

	Female (n=470) %	Male (n=37) %
Fiction	53	35
Non-fiction (other than cookbooks/guides etc)	43	51
Magazines/newspapers	37	46
Mysteries/science fiction	14	5
Cookbooks/guides/gardening books	13	3
Everything/anything	11	11
Romantic (e.g. Mills & Boon)	7	0
Poetry	2	3
Plays	0	3

Enjoyment of fiction rose from 33 percent of mothers with no qualification to 74 percent of those with a university degree. Enjoyment of non-fiction showed a less dramatic rise in relation to education, from 31 percent of mothers with no qualification to 56 percent of those with a tertiary qualification, and 48 percent of the university-qualified.

Home Writing Activities

As Table 102 shows, at age 10 some children were still engaged in copying printed material. More children were keeping a diary or journal. The proportion of children writing factual reports had also increased, probably related to what was asked of them in homework assignments. More imaginative writing, such as stories, poems, or plays, stayed at much the same level as at age 8.

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[77] We asked only the parents we interviewed about their reading preferences, and have not analysed fathers' preferences here in relation to children's preferences, because of the small number of fathers interviewed.

Table 102

Children's Home Writing Activities at Ages 6, 8, and 10

Writing Activity	Age 6 (N=297) %	Age 8 (N=521) %	Age 10 (N=505) %
Does word puzzles/crosswords	–	76	79
Copies material	80	82	76
Writes to family/friends	–	82	70
Writes short imaginative stories under 2 pages	–	60	60
Writes reports (factual writing)	–	40	57
Writes a journal/diary	3	34	41
Writes poems	–	33	33
Writes long imaginative stories over 2 pages	–	20	20
Writes plays	–	14	14
Writes lists	90	21	–

– = not asked

Children whose mothers had no qualification were more likely to copy written material (86 percent, falling to 68 percent of those with university-educated mothers).

Association of Writing Activities with Children's Competencies at Age 10

We found that writing activities were positively associated with children's competency levels at age 8, with the exception of copying. Children who had progressed beyond copying had higher scores for Mathematics, Logical Problem-Solving, reading, and Communication—but not writing itself.

At age 10, we continued to find that children who wrote at home had higher scores, particularly if their writing included reports, followed by plays, poems, or word-puzzles. Copying had no associations at all with children's competencies (though the group who did no copying scored 3 percentage points higher for the Cognitive Composite Competency, at the indicative level); and keeping a journal or diary, or writing long stories, showed fewer and smaller associations than the other writing activities we asked about.

Table 103 gives the percentage point differences between those who do a given activity, and those who do not, though they are likely to do other kinds of reading. An F indicates that the association did not remain after taking family income into account, and an M, that it did not remain after taking maternal qualification into account.

Table 103

Percentage Point Differences for Children Engaged in a Given Writing Activity, and those who are not Engaged in this Activity

	Copies Material	Letters friends & family	Short Stories	Long stories	Reports (Factual)	Journal/diary	Poems	Plays	Word puzzles
Curiosity	-	-	-	-	**4.4**	-	-	-	-
Perseverance	-	5.1	-	5.2	**9.7**	4.4	6.0	8.9	4.8
Individual Responsibility	-	8.6	5.8	5.7	8.8	5.0	6.7	**9.5**	6.0
Social Skills Peers	-	4.9	3.4	4.0	4.8	2.9	4.4	4.7	**6.9**
Social Skills Adults	-	4.4	-	-	**5.8**	-	4.6	5.0	3.9
Communication	-	3.7M	3.7	4.6	**8.7**	2.9 F	7.1	6.2	4.3
Mathematics	-	4.9	-	-	**9.6**	-	6.0	-	7.6
Fine Motor Skills	-	2.9	-	-	4.3	-	2.4	-	**5.5**
PAT Reading Comprehension	-	6.8	-	5.8	**9.9**	4.9	6.5	8.6	5.6
Burt Word Reading	-	5.1	-	6.1	**9.2**	3.1M	6.9	5.2M	5.8
Writing	-	4.3	3.5	4.4	**5.8**	2.6	4.5	-	4.4
Reading age	-	0.9	0.8	1.4	1.9	1.0	**2.0**	1.3	1.3
Logical Problem-Solving	-	-	-	-	**4.8**	-	3.9	4.3	3.5
Composite Competency	-	4.3	-	3.0	**6.6**	2.1	4.6	5.2	5.0
Composite Cognitive	-	4.0	-	3.2	**6.9**	2.2	4.7	4.5	5.2
Composite Social & Attitudinal	-	4.5	2.6	3.3	**7.0**	2.5	5.1	6.4	4.9

Highest percentage point differences found are in **bold** type.

These associations remained after allowing for family income or maternal qualification. There were also some interactions, showing different patterns for children in different income groups. The gap between those who wrote letters and those who did not was widest for children in families with incomes between $30–70,000, and was not really evident for children in families with incomes below $30,000, or above $70,000. Children who wrote long stories or plays had higher reading ages than those who did not, for all income groups other than the highest (more than $70,000).

Enjoyment of Writing

Fifty-four percent of the children enjoyed writing generally and 20 percent were said to enjoy some writing activities. Twenty-six percent of the children did not enjoy writing at all, slightly up on 19 percent at age 8. Boys were only half as likely to enjoy writing as girls: 35 percent, compared with 76 percent. They engaged less in all the writing activities asked about, other than copying, report writing, and puzzles. The gaps were widest for keeping a diary and story writing.

Enjoyment of writing, as reported by parents, was unrelated to family income or maternal qualification.

Forty-seven percent of the children enjoyed both writing and reading, and 11 percent enjoyed neither.

At age 8, we found that enjoyment of writing was positively associated with most competencies, other than Mathematics, the PAT Reading Comprehension test, and Curiosity.

At age 10, enjoyment of writing continued to show no associations with Mathematics and Curiosity, and was not associated with Logical Problem-Solving. Children whose parents thought they enjoyed writing had higher scores on the other competency measures than children whose parents thought they did not enjoy writing, or whose enjoyment varied. These associations remained after taking family income and maternal qualification into account.

Home Mathematics

The next table (Table 104) compares children's home mathematics activities at ages 6, 8, and age 10. It includes some more advanced number activities at age 10 for which we have no comparative data when the children were aged 6 or 8, and omits items which, by age 8, most children were already doing, such as using the telephone. It also omits some early number activities done at age 6 for which we have no comparative data as the children grew older, such as counting.

By age 10, more than 90 percent of the study children could add money correctly, use a calculator for simple addition or subtraction, and tell the time. Almost double the proportion at age 8 could do the times-tables up to 10, and use a calculator for simple multiplication or division.

Table 104

Children's Home Mathematics Activities at Ages 6, 8, and 10

Mathematics activity	When child aged 6 (N=297) %	When child aged 8 (N=521) %	When child aged 10 (N=505) %
Plays board games	89	97	95
Plays card games*	11	95	94
Adds money correctly	29	82	93
Can use a calculator for simple addition/subtraction	–	80	93
Can tell the time	–	75	90
Can use halves and quarters	–	77	87
Can use a ruler to measure length or height	–	75	84
Can do times-tables up to 10	–	43	78
Can use a calculator for simple multiplication/division	–	43	76
Uses scales to weigh things accurately	–	–	58
Does times-tables over 10	–	–	50
Can work out other fractions and portions	–	–	45
Plays computer games/uses computer for number activities	52	72	–

* Information volunteered by parents at age 6; specifically collected at age 8.

– not asked

Children whose mothers had no qualification were less likely to work out fractions, including halves and quarters, use rulers to measure, or use scales to weigh things.

Home Maths Activities and Children's Competencies

Table 105 shows the associations between these mathematical activities and children's competency levels at age 10, by giving the percentage point difference between those who were reported by their parent to do a given activity and those who did not. Almost all the activities we asked about showed an association with most of the children's competency levels, with the exception of playing card and board games (these had been good indicators of children's performance at earlier ages, when learning to count was more important). The activities which appeared to provide most advantage across the board were adding money, working out halves and quarters, doing times-tables up to 10, and being able to tell the time. These activities were also prominent at age 8. Mathematics and the PAT Reading Comprehension test score had the strongest associations with these mathematics activities. Curiosity and Fine Motor Skills showed the fewest associations.

The chart below gives the percentage point differences between those who do a given activity, and those who do not, though they are likely to do other kinds of reading. An F indicates that the association did not remain after taking family income into account, and an M, that it did not remain after taking maternal qualification into account.

Table 105

Percentage Point Differences between the Average Scores of Children Doing Maths Activity, and those who do not do this Maths Activity

Activity → Competency↓	Adds money	Tells time	Uses ruler to measure	Uses scales to weigh	Works out halves & quarters	Works out other proportions	Plays board games	Plays card games	Does times-tables up to 10	Does times-tables over 10	Uses calculator to add & subtract	Uses calculator to mult & divide
Curiosity	9.1	-	5.4M	-	6.0	-	**9.5**	-	5.3	4.2	-	-
Perseverance	12.9	9.1	8.5	5.5	10.5	7.5	-	-	**13.8**	10.9	10.8	5.0
Individual Responsibility	10.4	5.91,M	8.1	4.4	10.2	4.2	-	-	11.8	7.8	**14.1**	4.8M
Social Skills Peers	**10.4**	4.61,M	5.7	-	4.7M	2.1M	5.11,M	-	6.6	5.3	10.1	4.2M
Social Skills Adults	9.7	5.71,M	5.7M	-	**10.5**	3.7M	10M	-	6.9	4.1	9.0M	-
Communication	**11.1**	7.9 I	7.4	4.0	10.8	6.3	7.3M	-	10.5	7.6	7.6M	-
Mathematics	21.2	**24.1**	18.5	13.6	19.5	16.5	-	-	17.5	14.6	15.7	10.6
Fine Motor Skills	**6.8**	5.1	3.6	-	-	3.6	-	-	4.2	-	5.9	-
PAT Reading Comprehension	14.7	**17.4**	10.2	7.3	14.8	11.7	-	-	14.9	11.5	11.9	8.3
Burt Word Recognition	11.8	**15.6**	8.2	5.5	12.1	7.4	-	-	11.3	9.1	10.1	6.1
Writing	**9.9**	9.7	6.0	3.4	6.2	4.8	-	-	8.0	6.0	-	3.5
Reading age	2.5	**3.1**	2.5	1.6	2.4	2.1	1.61,M	-	2.8	2.2	2.1	1.6
Logical Problem-Solving	**10.7**	9.8	9.1	5.9	10.3	8.2	-	-	8.3	6.7	7.2	5.6
Composite Competency	**10.3**	8.2	7.4	4.3	9.1	6.1	4.4	-	9.5	7.1	7.1	4.2
Composite Cognitive	11.7	**13.3**	9.8	6.7	11.5	9.4	-	-	11.3	9.2	6.5	6.0
Composite Social & Attitudinal	**10.6**	6.3	6.8	3.2	8.8	4.4	7.6	-	9.2	6.7	8.5	3.9

Highest scores are in bold type.

Mathematics activity at home (outside school) had positive associations for children's competency levels, largely independent of family income and maternal qualification. Associations which were no longer evident after including family income or maternal qualification, were mainly in the social and attitudinal competencies.

As noted in the previous Competent Children project reports, mathematical activities which use knowledge, some school-based, in practical, everyday contexts appear to provide children with more than just rote learning, or repetition. Application of knowledge in not unfamiliar environments, but changing focus, allows children to develop their analytical skills and understanding. Using and understanding proportions is particularly important. The symbolic aspects of mathematics can also underpin growing confidence in reading, and, to a lesser extent, writing.

It is important to note that most of the children were reported by their parents to be doing most of the activities we asked about, and many were doing these activities by age 8 also. So this analysis points again to the importance of cumulative experience, and undertaking learning activities earlier rather than later. Put another way, at age 10 it was the children who had not become accustomed to using mathematics in their everyday life outside school who lagged behind others.

Comparing the average scores for different mathematical activities shows the highest scores in Mathematics occurring for children who could work out proportions other than halves and quarters (72 percentage points) and who could do the times-tables over 10 (70 percentage points). Children who did these two activities also had the highest scores for the Literacy measures, including writing.

Children whose mothers had no or mid-school qualifications who were adding money correctly were scoring higher than their peers by a difference of 20–40 percentage points for Mathematics, and 20 percentage points for writing.

Children from low income homes who were able to tell the time had the same Mathematics scores as children from high income homes (whether or not the latter children could tell the time).

Children whose mothers had no qualification and who used a calculator to multiply and divide did not have higher scores, unlike children whose mothers had a qualification.

Other Mathematical Activity Reported by Parents

Fifty-six percent of the children also did other mathematical activities at home. Children were engaged in construction, drawing plans, playing chess and draughts, making creative patterns for knitting, working with puzzle books and code breaking, playing games on, and in some cases programming, their computer, memorising car number plates, and getting to grips with multiplying and dividing large numbers and measuring things, as well as calculating trading profits and losses, keeping scores, and analysing sports team performance statistics. An interest in magic, reading and writing music, playing games such as snooker and using household appliances were among the other things mentioned by parents that they saw as having mathematical dimensions.

We grouped these mathematical activities into simple and advanced categories representing the five strands of the curriculum: geometry, algebra, number, measurement and statistics.[78] Examples of simple algebra are working with patterns, and colouring them in. Creating a knitting pattern would be an example of advanced algebra use. An example of simple statistics would be keeping the scores of a favourite sports team; an example of advanced statistics would be analysing those sports scores.

Table 106 shows some decrease since age 8 in the proportion of children reported by their parents to be using simple measurement and simple geometry, through such activities as playing with lego and doing jigsaw puzzles. But the proportions of children engaged in other mathematical activity at the simple level remained much the same or increased slightly. A higher proportion of children were said to be engaging in more advanced algebra and geometry, to do things such as draw plans, than at age 8.

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[78] Our thanks to Alex Neill, one of the Mathematics specialists for NZCER's Assessment Resource Banks for primary schools, for this categorisation.

Table 106

Other Home Mathematics Activities : Ages 8 and 10 Compared

Activity	Age 8 (n=230) %	Age 10 (n=283) %
Simple geometry	27	20
Simple algebra	16	13
Advanced algebra	8	13
Simple number	7	13
Advanced geometry	5	11
Simple measurement	16	10
Simple statistics	7	7
Advanced number	5	2
Advanced measurement	1	2
Advanced statistics	2	1

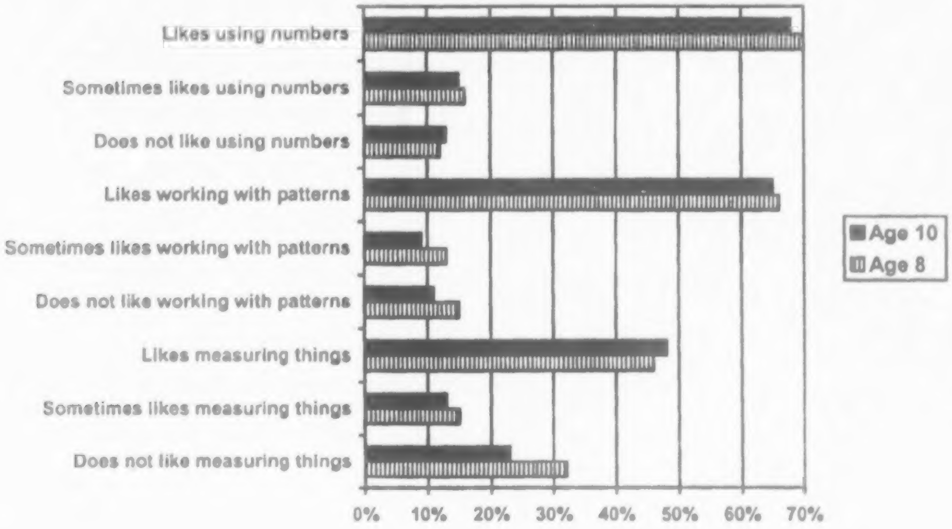
Children's Enjoyment of Mathematics

Figure 10 shows parental views at ages 8 and 10 of whether their child liked working with numbers, patterns, or measuring things. As at age 8, more children at age 10 liked working with numbers and patterns than with measurement. However, the proportion of children who were said to dislike measuring things dropped significantly between age 8 and age 10.

Parents did not always feel they knew whether their child enjoyed mathematical activities, particularly for working with patterns (16 percent), and measuring (15 percent). Parental opinions may be influenced by the degree to which they have observed their child's participation in mathematical activities.

Figure 10

Children's Enjoyment of Numbers, Patterns, and Measurement at Ages 8 and 10 as Reported by Parents



A third of the children were reported by their parents to enjoy all three of these uses of mathematics, and 29 percent enjoyed two of them.

By contrast with reading and writing, and teachers' perceptions of children's curriculum-related strengths (see Chapter 13), there were no gender differences related to mathematics activities at home. Boys were somewhat more likely than girls to enjoy using numbers (72 percent, compared with 62 percent).

Enjoyment of the three aspects of mathematics was not linked to enjoyment of reading or writing.

Enjoyment of Mathematics and Children's Competencies at Age 10

The associations between children's enjoyment of different applications of Mathematics and their competency scores show quite different patterns, with greater associations with the social and attitudinal measures than the Literacy measures, perhaps because of the focus on enjoyment.

Children who were thought by their parents to enjoy working with numbers had higher scores than children whose enjoyment varied, or who did not enjoy working with numbers, for Mathematics, all the social and attitudinal skills, and for Logical Problem-Solving, but not for the literacy measures. These differences remained after including family income and maternal qualification in the model.

Enjoyment of measuring was associated with Mathematics, where children who enjoyed measuring or sometimes enjoyed it scored around 6 percentage points more than children who did not. Children who enjoyed measuring scored 7–10 percentage points more than others for Curiosity. These differences remained after accounting for family income and maternal qualification.

Enjoyment of patterns was associated with higher scores for Curiosity, Perseverance, Individual Responsibility, Communication, and the PAT Reading Comprehension test, and these differences remained after taking family income and maternal qualification into account.

Summary

Understandably, children who are able to use their reading, writing, and mathematical knowledge and skills at home as well as at school show higher achievement levels. Learning is not confined to school as a physical place. More than that, it is the *enjoyment* of literacy and mathematics, of being able to see the world symbolically, that makes a difference. Our material also sketches the existence of 'virtuous' circles of shared interests and conversations between children and parents: links between parents who ask about homework, and enjoying homework, links between library visits—singling out books, the written word, as something with something to offer—and talking to parents about what they are reading. Again we see that it is sometimes harder for these virtuous circles to occur with parents who have little education themselves, and for whom reading is not something that has become part of who they are.

10 CHILDREN'S EXPERIENCES OF SCHOOL AND HOME

This chapter focuses on children's reports of their school and home experiences, children's and teachers' reports of bullying, parents' responses to difficulties their child encountered in problem-solving, and parents' reports of how their child was handling anything that upset them.

We have expanded the range of questions asked of children about their school and home experience for three main reasons:

- it is important to include children's perceptions;
- as the children grow older, they can handle longer interviews and more complex questions involving judgement;
- we wanted to have some insight into what was happening in classrooms and at home.

In the first phase of the study, we made observations of the early childhood education classrooms and settings, and the study children's engagement in learning, for the 307 children who attended 76 early childhood education centres, because of the Competent Children project's initial main focus on both short-term and long-term effects of early childhood education quality. As the Competent Children project has continued, we have seen the need for similar material on children's opportunities at school. However, the costs of carrying out similar observations for 507 children in 179 schools, and different classrooms within the schools, are too great for the funding available for the study. Asking the study children to sum up their experiences in school, using items drawn from other research on school quality and motivation, seemed a reasonable compromise in the circumstances, as well as intrinsically interesting in itself.

Similar reasons applied in relation to getting some picture of children's experiences at home, and we drew on existing research about the home support, resources, and experiences available to children to develop a set of items which children could be asked about.

We first used the *My Classroom Inventory* (MCI) when the children were aged 8, and we repeated it at age 10. The MCI is mostly used to provide a picture of classrooms as a whole, and given to all children in a classroom. Few of our children were in the same class as each other at age 10, so our use of it here, as at age 8, was to obtain an idea of how individual children experienced their classrooms.

At age 10 we have added two sets of items:

a) Items based on the *Quality of School Life* inventory, which covers relations with teachers, including fair treatment and support, enjoyment and engagement with school work, and relations with peers. This inventory was originally developed by the Australian Council of Educational Research, and has been used in their Longitudinal Studies of Australian Youth (e.g. Marks, 1998), with selected items used in International Educational Association (IEA) studies, including New Zealand, and by Nash and Harker (1994) in their *Progress at School* study. We have chosen items which we thought were appropriate for 10-year-olds, and items which appeared to have more weight than others in the analyses available.

b) Items which we hoped would tap differences in perceptions of the ingredients of achievement, particularly related to the role of effort, and 'benchmarks'—external in the form of marks and comparisons with other students, and internal in the form of new understanding. This set of items was developed after a scan of the available research on motivation and children's attributions. These items may be too crude for their purpose: research into children's motivation has grown more sophisticated, paying more attention to the context of children's perceptions of the work of learning and their role in it, particularly changes in perception related to different curriculum areas and individual children's multiple interests (e.g. Pintrich & Schunk, 1996).

There are some overlaps between these different sets of questions about children's own school experience, and their perception of their classroom environment.

Children's Experiences at School

Table 107 gives the children's responses to a range of items dealing with their views of their own experiences at school and the degree to which they have found the school environment supportive and enjoyable. Most children were positive about their experiences of school.

Table 107

Children's Views of their Experience at School

School is a place where	Always %	Often %	Sometimes %	Never %
I have good friends	79	13	6	1
Teachers help me do my best	66	24	9	1
Teachers treat me fairly in class	60	26	12	2
My teacher tells me when I do good work	59	29	11	1
I learn what I need for my future	58	30	12	0
I am treated ok	56	32	12	0
I enjoy myself	47	37	15	2
Teachers listen to what I say	47	34	17	1
I get all the help I need	45	35	19	1
I keep out of trouble	35	37	26	2
I do interesting things	29	46	23	1
I could do better work if I tried	28	23	43	6
I learn most things pretty quickly	27	48	23	2
I get tired of trying	6	16	54	23
I feel restless	4	13	54	29
I get bored	3	8	52	35
I get a hard time	2	11	44	43
I get bullied	1	6	31	62
I get upset	1	6	50	43
I feel lonely	1	5	36	59
I feel sad	1	5	34	60

Children's experiences of school were unrelated to their family income, or to the type of school ownership. Socio-economic decile showed only a few links. Children in decile 1–2 schools were most enthusiastic about finding school to be a place where they did interesting things: 52 percent said this was always the case, declining to 23 percent of children in decile 9–10 schools. But decile 1–2 children were also more likely to think that their teacher told them they were doing good work only sometimes (24 percent, compared with 11 percent of other children), and they had a higher rate of feeling sad at school: 17 percent felt this always or often, compared with 4 percent of children in other schools.

Maternal qualification did have some bearing on children's experiences. Children whose mothers had no qualification were more likely to be positive about these aspects of school:

- I do interesting things (41 percent said always, compared with 22 percent of children of tertiary/university-qualified mothers)
- Teachers help me do my best (80 percent said always, compared with 64 percent of other children)
- I get all the help I need (63 percent said always, compared with 42 percent of other children)

- I can learn what I need for my future (75 percent said always, compared with 55 percent of other children).

On the other hand, they were more likely to think:

- I could do better work if I tried (44 percent said always, declining to 17 percent of children of university-educated mothers)
- I get tired of trying (36 percent said always or often, declining to 14 percent of children of university-educated mothers)
- I feel lonely (11 percent said they felt this always or often, declining to 2 percent of children of university-educated mothers).

So, while school is an interesting and largely positive place, with positive interactions with teachers, for children coming from homes where their mother did not gain educational qualifications, they also find the *work* of school harder than others. This points again to the vital role of children's interactions and exposure to literacy and mathematics—not necessarily in any formal sense, but certainly in a day-to-day, 'natural' sense—before children get to school. Not having the same level of knowledge and practice in associated skills puts children at a disadvantage relative to other children.

Relations between Children's Views of Their School Experience, and Competency Levels

Children's perceptions of their school experiences showed links with most of the competencies. Curiosity and Fine Motor Skills were largely unrelated to children's reports of their time at school. The social and attitudinal competencies tended to have more associations with children's reports of their experience than literacy and Mathematics scores did.

The aspects of children's experience which showed the highest number of associations with children's competency levels (14 or more out of a possible 17) were to do with fair treatment, having interesting work, keeping out of trouble, and feeling that more effort would result in better work. The ones which showed the least relationship (8 or fewer associations) were to do with peer relations (or lack of them), including being bullied, and getting upset.[79]

Table 108 shows these relations in summary form. Most of the associations remained after taking into account family income and maternal qualification. Three interesting exceptions were feeling that one could do better work if one tried, getting tired of trying, and getting bored. Maternal qualification levels rather than children's reactions to school appeared to be the underlying factor behind differences in cognitive test scores, though the associations largely remained after taking family income into account.

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[79] Other studies have used the *Quality of School Life* questions with secondary students. and have reported findings not for individual items, but in terms of sets of related items (Marks, 1998), or statistically derived factors (Nash & Harker, 1998). This makes it difficult to compare our findings with others. Marks found more (albeit small) associations between Year 10 Australian students' general satisfaction (enjoyment) and their self-perceived achievement than their perception that teachers were fair and supported them.

Table 108

Summary Results of Modelling of Children's School Experiences

Competencies→ Child's View of School ↓	Curiosity	Perseverance	Individual Responsibility	Skills Social Peers	Social Skills Adults	Communication	Mathematics	Fine Motor Skills	PAT	Burt	Writing	Reading Age	Logical Problem Solving	Composite	Cognitive Composite	Social Composite	Count
I do interesting things at school		◆ FM		◆ FM	◆ FM	◆ FM	◆ FM		◆ FM	◆ FM	◆ FM	◆ FM	◆ FM	◆ FM	◆ FM	◆ FM	13
Teacher helps me to do my best	iM	◆ FM	◆ FM	◆ FM	◆ FM	◆ FM					◆ FM		◆ FM iM	◆ FM		◆ FM	10
I can learn what I need for my future		◆ FM	◆ FM	◆ FM	◆ FM	◆ FM	iF						◆ F iF M	◆ FM		◆ FM	9
I feel lonely at school							◆ FM		◆ FM	◆ FM	◆ M		◆ FM	◆ FM	◆ FM		7
Teacher treats me fairly		◆F iF M	◆F iF M	◆ FM	◆ FM	◆ FM	◆ FM	iF	◆ FM	F	◆ FM		◆ FM	◆ FM	◆ FM	◆ FM	14
I am treated OK	◆ FM				◆ F	◆ FM	◆ FM		◆ FM	◆ FM		◆ FM	◆ FM	◆ FM	◆ FM	◆ FM	11
I keep out of trouble		◆ FM	◆ FM	◆ FM	◆ FM	◆ FM	◆ FM		◆ FM	◆ FM	◆ FM	◆ FM	◆ FM	◆ FM	◆ FM	◆ FM	14
I feel sad				◆ M			◆		◆ FM		◆ FM		◆ FM	◆F	◆ FM		7
My teacher tells me when I do good work		◆ FM	◆ FM	◆ FM	◆ FM	◆ FM		iM						◆ FM		◆ FM	8
I get a hard time	◆ FM	◆ FM	◆F iF M	◆ FM	◆ FM	◆ FM	◆ FM		◆ FM	◆ FM	◆ FM	◆ FM	◆ FM	◆ FM	◆ FM	◆ FM	15
I could do better work if I tried		◆ FM	◆ FM	◆ FM	◆ FM	◆ FM	◆F iF M		◆ FM	◆F iF M		◆ FM	◆F	◆ FM	◆F iF M	◆ FM	13
Teachers listen to what I say		◆ FM	◆ FM	◆ FM	◆ FM	◆ FM							◆ FM	◆ FM		◆ FM	8
I get bored		◆ FM		◆ FM	◆ FM		◆F		◆F				◆ FM	◆ FM	◆F	◆ FM	9
I have good friends		◆F iF M	iF iM	◆ FM		◆ FM		◆ FM				◆ FM				◆ FM	7
I enjoy myself	◆ FM			◆ FM	◆M		◆ FM		◆ FM	◆ FM	◆ FM	◆ FM	◆ FM	◆ FM	◆ FM	◆ FM	12
I learn most things pretty quickly at school				◆F		◆ FM			◆ FM	◆ FM	◆ FM	◆ FM	◆ FM	◆ FM	◆ FM		9
I get tired of trying			◆ FM	◆ FM	◆ FM	◆ FM	◆		◆F			◆ FM		◆ FM	◆ FM	◆ FM	11
I get upset		◆ FM	◆ FM	◆ FM		◆M										◆ FM	5
I get all the help I need	◆ FM	◆ FM			◆ FM	◆ FM	◆ FM		◆ FM	◆M		◆F	◆ FM	◆ FM	◆ FM	◆ FM	12
I feel restless	iM	◆ FM	◆ FM	◆ FM	◆ FM	◆ FM	◆ FM					◆ FM	◆ FM	◆ FM	◆ FM	◆ FM	12
I get bullied		◆ FM	◆ FM	◆ FM		◆ FM								◆ FM		◆ FM	6
Count	6	15	13	18	15	17	14	3	13	10	9	11	16	19	14	18	212

◆ = association; iM= association remains after taking maternal qualification into account, F= association remains after taking family income into account; i = interaction.

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The highest competency scores were usually found among the children who gave their experience of positive factors (e.g. *I am fairly treated*) a rating of 'often' or 'always' rather than 'sometimes' or 'never'; and among the children who gave a rating of 'never' or 'sometimes' to a negative factor (e.g. *I feel lonely*), rather than 'always' or 'often'. In some models we did not include extreme categories because the numbers were too small; we did not amalgamate categories, however, because it was unclear to us that these rankings would act in a linear fashion, as indeed they do not for some factors.

The next chart (Figure 11) groups the different factors relating to children's school experience in terms of the ratings which stood out, either positively (indicated by +), or negatively (–). This chart shows that while there is little difference between children's ratings in terms of whether they talk of 'often' or 'always' for most of the ratings, there are some in which the rating that provides the best indication of children's competency levels is the 'often' rating, and some in which it is the extreme ratings that can provide a reasonable clue.

Figure 11

Children's School Views

Associations with cognitive and social competencies	Associations with social Competencies only	Associations with cognitive competencies only
Always/often		
Treated okay + Keep out of trouble + Fairly treated + Learn things pretty quickly + I could do better work if I tried –	I do good work + I get a hard time – I do interesting things + Teacher helps me do my best + I get all the help I need + Teachers listen to what I say + I have good friends +	
Always/sometimes (often stands out)		
I feel restless +	I learn what I need for my future + I get tired of trying –	I enjoy myself + I do interesting things + I get all the help I need –
Often/sometimes (extremes stand out)		
I get bored +	I get bullied +	

Grouping the associations this way shows several things:

- Either children recognise the reality of classroom life—children find themselves competing for teacher attention with other children or adults in the classroom—or, just as likely, children do not need constant adult attention and constant occupation to do well. One hopes that this is reassuring for teachers and parents alike!
- It is important for children's achievement all round that they consider themselves to be fairly treated by their teachers.
- Development in the cognitive areas is not related to perceptions of getting help, or being always interested, or supported. But these aspects are related to children's social and attitudinal competency levels (as rated by teachers). It is not clear whether this relationship is one-way, or, more likely, interactive.
- Some boredom and bullying behaviour is not unknown to most children, and does not appear to have a negative impact on their performance (though it will be interesting to see whether there is any cumulative impact, through persistent boredom or bullying). However, an intense rating for the 'two bs' does indicate lower performance and cause for concern.

Interactions

There were some interesting interactions, but most of these did not produce significant differences in children's scores and so are not reported here.

Only a small number of children thought they always got a hard time at school. The numbers in each income group are therefore small; but scores were much lower (at least 15 percentage points behind) for those in the middle and high income groups who felt they always got a hard time at school than for their peers who felt they often, sometimes, or never got a hard time at school. The pattern is different for low income children—those who felt they always got a hard time at school scored much the same as those who felt they only sometimes got a hard time at school, and around 8 percentage points *more* than those who felt they often or never got a hard time at school. These different patterns related to income do not lend themselves easily to interpretation on this information alone; one would need to test them out on larger samples, and find out more about factors, particularly related to peer and teacher interactions and values.

Children with family incomes between $30–50,000 who felt they could often learn what they needed for their future at school had significantly higher scores for Mathematics and Logical Problem-Solving than their peers in the same income group who felt they could always learn what they needed for their future, or only sometimes, a difference of around 15–16 percentage points.

There was a linear relationship between the scores for Perseverance and Individual Responsibility for children whose family income was above $50,000, with the highest scores on these competency measures found among those who felt they always had good friends at school. For children with family incomes below $30,000, the highest scores were instead found among those who felt they often had good friends at school.

Children's Views on Doing Well at School

We presented the children with a set of statements relating to their sense of making progress at school, and asked them whether they agreed or disagreed with each statement.

Most children agreed that working hard and learning something interesting were good indicators of progress. Gains in knowledge and understanding were also seen as signs that they were doing well. They were almost evenly divided about whether ease in a task could be seen as a sign of progress, and showed some ambivalence about the relevance of comparison with other children. Although 64 percent thought a good test result indicated that they were doing well, fewer that half agreed that being more knowledgeable than their classmates showed that they were doing well, and less than a quarter considered that making fewer errors than others was a measure of success. Conversely, most agreed that being mutually supportive of each other as friends indicated that they were doing well.

Table 109

Children's Views on Progress at School

	(N=507)		
I feel I am doing well at school when	Agree %	Disagree %	Not sure %
I solve a problem by working hard	90	4	6
I do my very best	90	4	6
My friends and I help each other	88	4	8
I learn something interesting	86	6	8
I work really hard	85	3	12
I get a new idea about how things work	84	5	11
What I learn really makes sense	84	3	12
Something I learn makes me think about things	76	7	17
I have the highest test marks	64	24	11
I do not have anything hard to do	49	35	16
I am the only one who can answer questions	44	43	13
I do not have to try hard	38	47	15
I know more than other people	37	46	17
Others get things wrong and I do not	23	60	17

There was a trend for a somewhat higher proportion of girls to agree that statements focused on effort were an indication that they were doing well at school:

- I work really hard (89 percent, compared with 81 percent of boys)
- I do my very best (95 percent, compared with 86 percent of boys).

In contrast, boys were somewhat more likely to compare themselves with others to find out how well they were doing, or feel that they were doing well when they did not have to apply themselves:

- I know more than other people (42 percent of boys, compared with 32 percent of girls)

- I have the highest test marks (69 percent of boys, compared with 59 percent of girls)
- I don't have to try hard (43 percent, compared with 33 percent of girls).

Children's answers here were generally unrelated to school characteristics, or family income. Only one item was related to maternal qualification. Seventy percent of the children whose mothers had no qualification thought that they were doing well at school when they did not have anything hard to do, compared with 45 percent of other children. However, the same pattern did not emerge with the related item *I do not have to try hard*. This fits with the material reported above: that children whose mothers lack qualifications find schoolwork intrinsically hard and demanding, even though they enjoy school, and trust teachers.

Children's Views on Progress Measures and Competency Levels

Children's reports of how they tell they are doing well at school, in terms of the items used, show less relationship with their competency levels at age 10 than their reports of their school experiences do. The competencies with the strongest associations were the Burt Word Reading test (associated with 7 of the 14 items in this set), Logical Problem-Solving, Perseverance, and Individual Responsibility (6 items each). Least associated were Curiosity and Social Skills with Peers (3 items each).

The item which stood out here was *I feel I am doing well when I solve a problem by working hard* (associated with all 13 competency measures). *I feel I am doing well at school when I don't have anything hard to do* was associated with 9 competency measures, followed by *I feel I am doing well at school when I work really hard*, or *when something I learn makes me think about things*, or *when I have the highest test marks* (associated with 7 competency measures).

Almost all the associations remained after taking family income and maternal qualification separately into account.

Table 110

Summary of Associations Between Attitude to Schoolwork and Competencies

Competencies→ Child's Attitude to schoolwork↓ I feel I am doing well at school when:	Curiosity	Perseverance	Individual Responsibility	Social Skills Peers	Social Skills Adults	Communication	Mathematics	Fine Motor Skills	PAT	Burt	Writing	Reading Age	Logical Problem Solving	Composite	Cognitive Composite	Social Composite	Count
I work really hard		◆ FM	◆ F	◆ FM	◆F	◆ FM				◆ FM	◆ FM			◆ FM		◆ FM	9
I am the only one who can answer questions		iF			◆ FM		◆F							◆ FM			4
Something I learn makes me think about things			iF	◆ FM	◆F iF M	◆F iF M		◆ FM	◆ FM				◆ FM	◆ FM	◆ FM	◆F iF M	10
I know more than other people			◆ FM	◆ FM									◆ FM			◆ FM	4
I don't have anything hard to do		◆F	◆F				◆ FM	◆ FM	◆ FM	◆ FM	◆ FM	◆ FM	◆ iF	◆ FM iM	◆ FM		11
I have the highest test marks						◆F iF M iM	◆ FM	iM		◆ FM	◆F	iM	◆F iM	◆ FM iM	◆ FM		9
I do my very best.		◆F iF M	◆ FM	◆ FM												◆ FM	4
My friends and I help each other	IF																1
Others get things wrong and I don't.		iM						◆ FM		◆M							3
What I learn makes sense				IF					◆ F iF iM	◆F iM	◆ FM	iF			◆ F iF M		6
I don't have to try hard				M													1
I learn something interesting	IF																1
I solve a problem by working hard	◆ F	◆ F	◆F iF M	◆F iF M	iM	◆ FM iM	◆ FM	iF iM	◆ FM	◆ FM	◆ FM	◆ FM	◆ FM	◆F iF M iM	◆ FM	◆ FM	1
I get an idea about how things work				◆ FM			◆ FM			◆ FM	◆ FM	◆ FM iM	◆ FM iM	◆ FM	◆ FM		
Count	3	6	6	8	4	4	5	5	4	7	6	5	6	7	6	5	8

◆ = association; M= association remains after taking maternal qualification into account, F= association remains after taking family income into account; i = interaction.

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There was little difference between the scores of those who agreed with an item and those who were unsure. Generally, these scores were higher than the scores of those who disagreed with the items which show associations in the table above. The exception is for the item *I feel I am doing well at school when I have nothing hard to do*, where those who *disagreed* had higher average scores.

Interactions

While there were a number of interactions evident when we modelled the associations with family income and maternal qualification, many interaction effects could not be estimated because of the small or zero numbers in some cell sizes of the associated cross-tabulations. In other cases, the patterns within the interactions were not consistent.

One interaction was particularly interesting, given the picture developing so far of why maternal qualification may play such a strong role in children's competency levels at age 10. The associations between the item *I feel I am doing well at school when something I learn makes me think about things* and children's PAT Reading Comprehension test scores did not exist for children whose mothers had no qualification: it did not matter whether they agreed with the item or not. But when it came to the Logical Problem-Solving test, children whose mothers had no qualification and who agreed with this sign of doing well at school scored higher than their peers who disagreed with the item. The Logical Problem-Solving test is non-verbal, and does not rely on language use and experience, including exposure to different contexts and opportunities for experience, unlike the PAT Reading Comprehension test. This explanation for the two different patterns fits with an interpretation of the gap between home and school as based primarily in knowledge and language use. However, it also has to be said that this was the only item where such different patterns were evident.

Children's Perceptions of Their Classrooms

Another indication of children's perceptions of their classrooms in relation to the degree of competitiveness, the difficulty of the work, general enjoyment (satisfaction), friction between children, and friendliness between children (cohesion) has been gained from the *My Class Inventory (MCI)* 5 subscales.

The next table gives the overall responses at age 10 to each item, grouped by subscale, and compares them with the responses at age 8. Most children had positive things to say about their classrooms. Interestingly, though fewer children found their work demanding at age 10, fewer also considered their work enjoyable.

The level of competition experienced by children remained much the same between ages 8 and 10. Most children experienced some competition with others. The level of friction experienced by children in their classrooms appeared to have dropped, and they were perhaps taking a more discriminating view of their relations with other children in the class.

Table 111

Children's Perceptions of Their Classroom Using the My Class Inventory

	Age 8 (N=522) %	Age 10 (N=507) %	Mean score (out of 15)	
			Age 8	Age 10
Satisfaction				
The children enjoy their school work in my class	85	64		
Some children are not happy in my class	71	62		
Children seem to like my class	90	82		
Some children don't like my class	52	52		
My class is fun	94	85	11.89	11.49
Friction				
Children are always fighting with each other	34	16		
Some of the children in our class are mean	69	61		
Many children in our class like to fight	32	26		
Certain children always want to have their own way	74	78		
Children in my class fight a lot	35	19	11.31	9.30
Competitiveness				
Children often race to see who can finish first	51	55		
Most children want their work to be better than their friend's work	48	51		
Some children feel bad when they do not do as well as the others	72	71		
Some children always try to do their work better than the others	69	74		
A few children in my class want to be first all of the time	75	78	11.31	11.87
Difficulty of work				
In my class the work is hard to do	50	57		
Most children can do their schoolwork without help	84	75		
Only the smart children can do their work	29	9		
Schoolwork is hard to do	43	28		
Most of the children in my class know how to do their work	92	89	7.92	7.25
Cohesiveness				
In my class everybody is my friend	38	31		
Some people in my class are not my friends	78	78		
All children in my class are close friends	67	40		
All of the children in my class like one another	49	32		
Children in my class like each other as friends	80	66	10.10	9.07

Children's responses were unrelated to school decile. Children attending private schools were less likely to report that many children in their class liked to fight (9 percent, compared with 34 percent of children attending state and state-integrated schools), as were low income children (16 percent, compared with 29 percent of middle and high income children).

Maternal qualifications were related to four items. Fifty-three percent of the children whose mothers had no qualifications thought that *all the children in my class are close friends*, declining to 28 percent of the children of university-educated mothers. A similar but less dramatic trend was evident for the item *the children in my class like each other as friends* (75 percent, declining to 59 percent). Forty-four percent of the children whose mothers had no qualifications thought that *schoolwork was hard to do*, declining to 17 percent of children of university-educated mothers.[80] Yet 75 percent of the children whose mothers had no qualification thought that *most of the children in my class know how to do their work*, declining to 59 percent of children of university-educated mothers.

Fifty-one percent of the boys thought that the work in their class was hard to do, compared with 40 percent of the girls.

We analysed children's responses here in terms of their score for four of the sub-scales; we did not analyse responses for the subscale *satisfaction,* since it showed only two associations at age 8, and we had additional information at age 10 about the children's enjoyment of school.

At age 10, we found only one indicative association with children's rating of their class on the *friction* subscale. Children who rated their classroom low in friction scored around 3 percentage points more for Social Skills with Peers than those who rated their classroom medium or high in terms of friction. However, when we included family income in the model, we found a number of interactions indicating that children from low income homes who were in classrooms they rated high for friction scored *higher* than others from low income homes for Perseverance, Communication, and Fine Motor Skills. But children from high income homes who were in classes they rated highly for friction scored *lower* than their peers from high income homes for the PAT Reading Comprehension and Burt Word Reading tests. Does this indicate different expectations and values for children from different social backgrounds? It is not clear from our data that this is so. If it was, one might expect to have found a similar interaction with maternal qualification, but we did not.

At age 8, we found that children who judged the level of *competition* in their class to be low had the highest scores for reading, Social Skills with Peers, and Perseverance; children who gave their class medium scores generally had the lowest scores for these competencies. However, at age 10, we found no associations other than an interaction between family income and the ratings. Children from low income homes who felt their classroom was low or medium in terms of competition scored as highly as those from high income homes who gave their classes the same ratings. In contrast, children from low income homes who found their class highly competitive scored around 10 percentage points lower—but children from high income homes who also found their class highly competitive scored around 10 percentage points more.[81] Perhaps children from high income homes see competition differently.

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[80] Maternal qualifications were unrelated to whether children said schoolwork was not hard—the difference came in the answers indicating that it was hard, or sometimes hard.

As at age 8, children who rated their class low on the *cohesiveness* subscale, which focuses on student friendliness, had higher scores for Mathematics, Logical Problem-Solving, and the reading measures. Since this trend was evident at age 8 also, it does not seem to reflect the changing and perhaps more reflective views of friendship that seem evident in the children's answers on this subscale at age 10.

Table 112

Child's Rating of Their Class for Cohesiveness and Competencies at Age 10

Child's rating of their class for Cohesiveness→ Age 10 Competency↓	Low, *5 to 7* *mean* n=207	Med, *8 to 11* *mean* n=200	High, *12 to 15* *mean* n=100	Prob. of F-value from anova	Percent variance acct. for
Mathematics	**70.4**	59.8	54.0	**0.0000000004**	**8.2**
Literacy —PAT Reading Comprehension	**55.0^**	47.1^^^^	40.2^	**0.00000002**	**6.8**
Literacy—Burt Word Reading	**68.5**	62.1	61.5	**0.0001**	**3.6**
Literacy —reading age	**11yrs10mth**	11yrs1mth	10yrs9mth	**0.00000003**	**6.7**
*Logical Problem-Solving**	**65.0**	60.2	55.7	**0.00000005**	**6.5**
Composite Competency*	**70.6^^**	68.2^^^^	67.0^	0.011	1.8
Composite Cognitive Competency*	**67.5^^**	61.9^^^^	57.9^	**0.000000002**	**7.7**

* In these cases the squared model was a better fit. ^ one fewer in this mean, ^^ two fewer in this mean, ^^^ three fewer in this mean, etc. The highest scores for each competency are in bold type.

These associations remained after including family income in the model. When we included maternal qualification, we found these associations reduced for literacy and Logical Problem-Solving, but not for Mathematics. We also found some intriguing interactions. Children with university-qualified mothers who gave a high rating for classroom cohesiveness had higher scores for Perseverance (9–12 percentage points more) than their peers with university-qualified mothers who gave a medium or low rating for classroom cohesiveness. The opposite trend was evident for children whose mothers have mid-school qualifications—the highest scores were among the children who gave the lowest ratings for classroom cohesiveness. Similar if less dramatic trends were evident for Social Skills with Adults, and, for children whose mothers have mid-school qualifications, for Logical Problem-Solving. These interactions raise interesting questions about perceptions of friendship and its realisation in relation to work in classrooms.

As at age 8, the *difficulty* subscale was the one which showed the most associations with children's competency levels. Children who gave high ratings to the level of difficulty they and their classmates encountered in their work had lower scores than others. Children who gave low ratings had higher scores than those who gave medium ratings, for Perseverance and Social Skills with Peers.

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[81] While studies which have used the *My Class Inventory* for whole classes usually find some relation between each of the instrument's subscales and children's performance, the findings for the competitiveness scale have been inconsistent (Fisher, Fraser, & Bassett, 1995).

Table 113

Child's Rating of Their Class for Difficulty and Competencies at Age 10

Child's rating of their class for Difficulty→ Age 10 Competency↓	Low, *5* *mean* n=164	Med, *6 to 8* *mean* n=181	High, *9 to 15* *mean* n=16	Prob. of F-value from anova	Percent variance acct.for
Perseverance	**75.6**	71.0	63.5	**0.0000001**	**6.2**
Individual Responsibility	**72.5**	70.6	61.2	**0.00000004**	**6.6**
*Social Skills with Peers**	**72.0**	69.5	64.6	**0.0000004**	**5.7**
*Social Skills with Adults**	**78.7**	76.1	70.5	**0.00004**	**4.0**
*Communication**	**75.4**	72.8	64.2	**0.0000000002**	**8.4**
Mathematics	**68.1**	64.7	55.9	**0.000003**	**4.9**
Fine Motor Skills*	**87.2**	**87.2**	83.9	0.030	1.4
Literacy—PAT Reading Comprehension	**54.7^**	50.7^^	41.2^^^	**0.00000003**	**6.7**
Literacy—Burt Word Reading	**68.8**	65.7	59.1	**0.000001**	**5.3**
Literacy—writing*	**73.7**	71.1	68.3^	**0.0008**	**2.8**
Literacy—reading age	**11yr9mth**	11yr6mth	10yr8mth	**0.0000002**	**6.0**
*Logical Problem-Solving**	**63.1**	62.0	58.6	0.016	1.6
Composite Competency*	**72.3^**	69.8^^	64.4^^^^	**0.0000000002**	**8.7**
Composite Cognitive Competency*	**66.8^**	64.4^^	58.8^^^^	**0.0000001**	**6.1**
Composite Social & Attitudinal Competency*	**73.4**	70.6	64.5	**0.00000001**	**7.0**

* In these cases the squared model was a better fit. ^ one fewer in this mean, ^^ two fewer in this mean, ^^^ three fewer in this mean, etc. The highest scores for each competency are in **bold** type.

When we included family income and maternal qualification separately in the model, these associations with the *difficulty* subscale remained. There was one interaction: among children from middle income homes, those who rated classroom difficulty highly had scores for Mathematics around 15 percentage points lower than their peers, compared with differences of around 5 percentage points among children from low and high income families.

Children's Responses to Difficulties in Their Work

Table 114 compares children's responses to difficulties in their work at age 6 and age 8. Children aged 10 were more inclined to seek help from a teacher if they struck problems with their school work, particularly if they were experiencing difficulties with Mathematics. At age 10, they were also somewhat more likely to ask a friend or one of their peers for assistance. A small number of children whose responses fell into a category other than that shown on the table would ask their parents when they got home, resort to guesswork, or copy their friends' work. Around three-quarters of the children gave us a single strategy; around 20 percent gave us two strategies for reading and Mathematics, and 25 percent for writing. Three or four strategies were given by around 4 percent of the children.

Table 114

Children's Responses to Difficulties in Their Work at Ages 6, 8 and 10

Response	Reading %			Writing %			Maths %		
	When aged 6 (N=298)	When aged 8 (N=523)	When aged 10 (N=507)	When aged 6 (N=298)	When aged 8 (N=523)	When aged 10 (N=507)	When aged 6 (N=298)	When aged 8 (N=523)	When aged 10 (N=507)
Request help from teacher	27	24	34	27	25	35	29	28	44
Request help from peer	20	21	26	10	11	21	30	19	25
Keep trying	11	7	8	19	17	20	22	48	34
Sound letters out	27	42	28	25	16	9	–	–	–
Choose something easier	10	6	6	2	1	1	9	3	3
Use contextual strategy	9	11	16	–	–	–	–	–	–
Do something else	2	1	0	3	1	1	3	0	1
Look at dictionary/words on wall	3	–	4	22	46	39	–	–	–
Get a calculator	–	–	–	–	–	–	–	5	4
Give up/wait for teacher/do not know	2	2	4	2	2	4	7	4	4
Never have a problem	1	1	3	0	1	2	2	4	4

Children's responses to reading, writing, or mathematics problems were unrelated to their family income or maternal qualification, with two exceptions. Twenty-four percent of the children whose mothers had no qualification would persist with a Mathematics difficulty, increasing to 40 percent of those whose mothers had a university qualification. Ten percent of children whose mothers had no qualification would find an easier book if they struck a problem in reading, decreasing to 3 percent of those whose mothers had a university education.

Girls would more readily ask their teacher for help with mathematics than boys would (53 percent, compared with 37 percent); and 7 percent of boys said they found nothing hard about mathematics, compared with 1 percent of the girls.

Girls were also more likely than boys to say they would request help from a peer with any difficulties (32 percent, compared with 21 percent for reading, 25 percent, compared with 17 percent for writing and 33 percent, compared with 19 percent, for mathematics). Five percent of boys said they would give up or wait for the teacher if they had difficulty reading or writing, compared with 2 percent of girls.

Pakeha children with a reading difficulty were less inclined than others to seek help from the teacher (31 percent, compared with 46 percent of others), and Asian children were less inclined to do so for a mathematics difficulty (17 percent, compared with 46 percent of others). Maori children were less likely to say they would persist with a mathematics difficulty (20 percent, compared with 36 percent of others).

Children's Strategies for Solving Social Problems Encountered at School

To gain some idea of the children's response to social problem-solving at school, we presented them with two different situations requiring resolution. These responses were included in the Social Skills with Peers measure, and were reported in Chapter 2. What we report here are any differences related to gender or social group.

Group differences in responses related to sharing a scarce resource

Girls were somewhat more likely than boys to give a first answer involving a social request (72 percent, compared with 63 percent); boys were more likely to have an aggressive response (4 percent, compared with none of the girls). But if their first approach was not successful in getting them a turn of the scarce resource, girls were just as likely as boys to show aggression.

Other responses to a failed first approach did show some gender differences. Girls were marginally more likely to keep asking politely (15 percent, compared with 9 percent of boys), twice as likely to negotiate (10 percent, compared with 5 percent of boys), and half as likely to find another source of supply (4 percent, compared with 9 percent).

Children of university-educated mothers were most likely to use negotiation (12 percent, declining to 3 percent of children whose mothers had no qualifications). Thirteen percent of the children whose mothers had no qualifications would ask the teacher for help straight away, declining to 1 percent of the children of university-educated mothers. There were also differences related to maternal qualification with the second attempt to gain a share of a scarce resource. Children whose mothers had no qualification were most likely to ask politely for a turn (30 percent, declining to 17 percent of children of university-educated mothers), but least likely to add a justification to their request (6 percent, compared with 16 percent of others).

Children at decile 1–2 schools had higher rates in their first attempt of asking a teacher for help (11 percent, compared with 4 percent of children in decile 3–10 schools), or using aggression to get their turn (9 percent, compared with 1 percent of children in decile 3–10 schools). However, the rate of aggression in the second attempt was no different from others. More decile 1–2 children gave a passive response in their second attempt to obtain a share of the scarce resource (9 percent, compared with 2 percent of children in decile 3–10 schools).

Group differences in responding to bullying

The next table compares children's first and second responses to being picked on by another child when playing outside at lunchtime, and how they would resolve the situation if their first attempt didn't work.

Table 115

Children's Strategies when Encountering Difficulties in the Playground

Strategy	Initial response (N=507) %	Second response (N=507) %
Assertive response	46	14
Go somewhere else/do something else	21	18
Ask teacher to help	21	55
Aggressive	5	4
Passive/do not know	3	3
Seek help from another child	2	1
Seek help from group of friends/gang	1	2
Tell mum/dad/parents	0	2
Use peer mediators	0	1

Boys were more likely to offer an aggressive response than girls: 8 percent, compared with 2 percent in the initial response, and 8 percent, compared with 1 percent in the second response. This was the only gender-related difference.

Children who had actually been picked on or bullied in the few months before our interview with them gave much the same answers as those who had been left alone.

Children whose mothers had no qualifications were more reliant on teacher intervention: 34 percent would ask a teacher for help if they were picked on, compared with 20 percent of others; and 33 percent would respond assertively, compared with 48 percent of other children. However, the patterns were very similar when it came to a second response if the first did not resolve the situation.

'Are you jealous that I am Big Bertha?' Children's Experiences of Bullying at School

Student safety at school has been identified by the Education Review Office (ERO) as a cause of concern.[82] As we have seen, 48 percent of the study children indicated that they had had some experience of being bullied at school. Thirty-one percent of the children responded to a direct question by saying that they had had recent experiences of being bullied by other children. Most of these incidents had taken place at school.

Teasing was the predominant form of bullying mentioned. Sixty-eight percent of the children who were bullied said that they had been subjected to verbal abuse, and 38 percent to physical abuse. Others had been left out and rejected (9 percent), had their possessions taken (7 percent), or been ganged up on (3 percent). In 4 instances (1 percent) weapons such as a knife had been used.

Incidents and forms of bullying were unrelated to school or family characteristics. Boys were around twice as likely as girls to be physically bullied (15 percent, compared with 8 percent). Verbal bullying was similar for both boys and girls.

It is reasonably common for schools to operate peer monitoring systems calling in peer support for teasing and other forms of bullying, such as the 'fuss busters' and 'buddy' patrols. These are not yet a first port of call for children experiencing such problems. Forty-two percent of the study children reporting bullying called on an adult for assistance (36 percent on the teacher and 7 percent on their parents). A third did nothing and tried to ignore the incident, and 7 percent hid or ran away. Of those who did try to deal with the situation themselves, 7 percent said that they attempted to resist, 3 percent adopted a conciliatory approach, and 3 percent took an aggressive stance.

Only 6 percent adopted an assertive approach such as that taken by the child who was persistently teased and called 'Big Bertha' by another. A direct enquiry as to whether the tormentor was jealous of her being called 'Big Bertha' caused an immediate end to the teasing!

Some responses varied in relation to the kind of bullying. Children who had been verbally bullied or left out were more likely to ignore things than those who had been physically bullied (37 percent, compared with 22 percent). Most children who had been physically bullied did not reply in kind; only a few children who had been verbally bullied or left out resorted to physical defence. Children whose mothers had no qualifications were most likely to ignore—put up with—the bullying (21 percent, compared with 10 percent of children whose mothers had mid-school or tertiary qualifications, and 5 percent of those whose mothers had a university qualification).

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[82] Education Review Office (2000), *Safe Students in Safe Schools*, Wellington: Education Review Office, p. 2.

ERO states[83] that it is difficult for teachers to gauge whether the school provides a safe physical and emotional environment without getting feedback from parents and students. We found that student reports of being bullied or bullying showed a higher rate of bullying than indicated by teachers' reports for the study children. Thirty-two percent of the children said they had been picked on or bullied in the last couple of months before we interviewed them at school, compared with teachers' reports that 20 percent of the children had been picked on or bullied. This difference may be because teachers do not see everything that occurs in playgrounds, during lunchtime and breaks.

Table 116 compares teachers' and study children's responses in terms of the kind of bullying which took place.

Table 116

Bullying at School: Children's and Teachers' Reporting

	Children's experience of being bullied %	Teacher awareness: child being bullied %
Verbal	21	14
Direct physical	12	5
Being left out/rejected	3	7
Taking child's possessions	2	2
Weapons used	1	1
Ganged up on	1	2
Other	1	1

Teachers' reports of bullying showed no differences related to family income or gender. They did report a higher rate of verbal bullying of Pacific Islands children (32 percent, compared with 13 percent of Pakeha/European, and 10 percent of Maori children).

We looked at three of the Social Skills with Peers items to see if skills here were related to experiences of bullying. Children who were rated low for their ability to work with other children for an extended period of time without needing adult intervention were in fact *less* likely to be bullied than others. Those who were never led astray by peer pressure were least likely to bully: 4 percent, rising to 48 percent of those who were often or always led astray by peer pressure, as were those who were never left out of games by other children: 14 percent, rising to 33 percent of those who were sometimes or often left out of games. Children who were left out of games were also the ones most likely to be bullied: 44 percent of those who were sometimes/always left out of games, compared with 24 percent of those left out.

Fourteen percent of the teachers who reported being aware of bullying had not become involved in the situation. However, most of the teachers who had noticed bullying thought the situation had been resolved. Only one teacher mentioned intervening directly at the time the bullying was taking place. Twenty-eight percent of the teachers who reported that individual study children had been bullied said that they had spoken to the children involved after the event, 24 percent had worked out a formal strategy for handling these events at school, and a further 9 percent had developed a plan for handling any recurrences. Seven percent said that they had taken the practical step of rearranging classroom seating. A handful of teachers passed the problem on, 4 percent to another teacher, and 1 teacher had involved the child's parents.

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[83] ibid, p. 12.

Twenty percent of the children had bullied other children, to the teacher's knowledge. Forty-six percent of these had been the subject of other children's bullying.

Boys were more likely to come to teachers' knowledge as bullies (24 percent, compared with 14 percent of girls). This may be because while girls who bullied were just as likely as boys who bullied to use language as a weapon, boys were much more likely to initiate fighting: 45 percent, compared with 12 percent of the girls.

While the proportions of study children whom teachers knew to have been the subject of bullying did not vary by school decile, 35 percent of the children in decile 1–2 schools were known by teachers to have bullied another child in the last few months, compared with 18 percent of children in decile 3–10 schools.

We used teacher responses to analyse the children's experiences of bullying in relation to their competency levels. We had full data for 434 children.[84] Sixty-eight percent had neither bullied nor been bullied, as far as the teacher knew. Ten percent had been both bully and victim, another 10 percent had been bullies, and 11 percent had been victims only.[85]

Experiences of bullying showed significant associations with all but one of the social and attitudinal competencies, and with reading age, which was also judged by teachers; but they showed no associations with the other literacy measures, and an indicative association only with Mathematics. Children who bullied tended to have lower scores than those who were neither victim nor bully, or who were victims of bullying but did not bully themselves.

Bullying behaviour had a stronger association than family income or maternal qualification with the social and attitudinal competencies. But though the associations between bullying and scores for Mathematics and reading age were reduced by adding family income, they remained. The difference between the average scores of those who had no personal experience of bullying and those who had bullied increased when maternal qualification was included in the model from 7 to 9 percentage points.

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[84] Teachers felt they did not know whether 53 of the children had been bullied, and whether 39 had bullied, giving a total of 73 children for whom data on bullying supplied by teachers was unavailable. Comparing the competency scores for these children with those for whom we had data showed that their scores tended to fall between bullies and those who did not bully.

[85] Wolke (1999) divides the bullying experience of his survey of 2,377 English children aged 6-9 into four categories: neutral (no involvement in bullying), bullies, victims, and bully/victims. He analysed his data in terms of whether the bullying was physical or relational (e.g. name-calling). In his sample, the ratio of pure bullies to bully/victims was about 1:3; in ours, it was 1:1.

Table 117

Bullying and Competencies at Age 10

Bullying→ Age 10 Competency↓	bully *mean* n=45	bully & victim *mean* n=45	victim *mean* n=48	neither *mean* n=296	Prob. of F-value from anova	Percent variance acct.for
Curiosity	61.9	60.0	61.3	**65.9**	0.070	1.6
Perseverance	65.2	57.5	66.4	**74.2**	**0.00000004**	8.3
Individual Responsibility	58.2	51.9	71.9	**72.6**	**0.0000000000**	14.2
*Social Skills with Peers**	62.3	55.1	69.0	**72.0**	**0.0000000000**	19.8
*Social Skills with Adults**	67.6	62.2	78.3	**78.7**	**0.0000000001**	10.7
*Communication**	66.9	64.4	72.0	**73.6**	0.001	3.6
Mathematics	58.1	58.0	59.9	**65.3**	0.045	1.8
Literacy —reading age	11yr2mth	10yr6mth	11yr2mth	**11yr8mth**	**0.0009**	3.8
*Composite Competency**	65.1^	61.6^^	68.3	**71.2^^**	**0.00000004**	8.4
Composite Social & Attitudinal Competency*	63.7	58.5	69.8	**72.9**	**0.0000000000**	11.7

* In these cases the squared model was a better fit. ^ one fewer in this mean, ^^ two fewer in this mean, ^^^ three fewer in this mean, etc. The highest scores for each competency are in bold type.

Children's Experiences of Bullying Outside School

Most bullying among 10-year-olds occurs on school grounds. Only 7 percent of the study children said that other children had bullied them when they were not at school, either at home (3 percent), on the way to or from school (2 percent), in a public place, or at a friend's or relative's house (1 percent each). Patterns of bullying behaviour were very similar to those reported in relation to bullying at school—predominantly verbal.

Children's reported reactions to being bullied outside the home were also similar to the actions taken at school, with around half telling an adult what had happened, around a third choosing to ignore the incident or run away, 18 percent fighting back, and 9 percent bargaining with the perpetrators. Just under a quarter of the children who experienced bullying outside school said that the bullying was recurrent.

Children's Home Experiences

We asked children to let us know about their home experiences by rating them on a four point scale—*always, often, sometimes* or *never.* We used this scale because we had used it for the school experiences scale, and wanted to avoid too many different scales, and because it provided a neutral description, rather than asking them to judge their home experience for an outsider who was not part of their day to day life.

Most children felt supported at home, and treated fairly. Most found interesting things to do there.

Table 118

Children's Views of Home

	Always %	Often %	Sometimes %	Never %
My family makes sure I do my homework	78	14	7	1
I get things explained to me if I do not know them	65	23	10	1
I get help if I need help	59	26	15	1
My family asks me about school	49	30	17	4
I get treated fairly	49	35	14	2
I get listened to	40	33	25	3
I have my friends to play	34	38	26	3
I do lots of good things with my family	26	42	30	1
I have lots of interesting things to do	25	44	30	1
Our relatives come	22	35	38	4
I help out	21	43	33	3
I get told off	8	24	63	4
I get bored	6	14	60	20
I feel lonely	2	4	29	65

Family income levels showed only two differences:

- children in low income families were most likely to say that they were always listened to at home (55 percent, compared with 37 percent of children from middle and high income families)
- children in low income families were most likely to say they felt lonely at home (9 percent said they felt this always or often, compared with 1 percent of children in high income families).

There were some trends related to maternal qualification levels. Children whose mothers had no qualifications were more likely to give lower ratings for these items:

- I have lots of interesting things to do at home (39 percent said sometimes or never, compared with 22 percent of children of university-educated mothers).
- I do lots of good things with my family (42 percent said sometimes or never, compared with 28 percent of children of university-educated mothers). Yet, contradicting this, 30 percent of children whose mothers had not qualifications said they never got bored at home, compared with 13 percent of children of university-educated mothers
- I get treated fairly (25 percent said sometimes or never, compared with 9 percent of children of university-educated mothers)
- I get things explained to me if I do not know them (19 percent said sometimes or never, compared with 4 percent of children of university-educated mothers).

They gave higher ratings for these items:

- I help out (30 percent said always, compared with 14 percent of children of university-educated mothers)

- I feel lonely (8 percent said they were always or often lonely, compared with 2 percent of children of university-educated mothers).

Children of university-educated mothers were most likely to have things explained to them if they did not know them (only 4 percent said this happened sometimes or never, compared with 19 percent of children whose mothers had no qualifications, and 12 percent of those who had school or tertiary qualifications).

Only two of the items were answered differently by boys and girls. Boys gave a lower rating to these items about their home:

- I do a lot of good things with my family (37 percent said sometimes or never, compared with 25 percent of girls)
- I get told off (10 percent said they were always being told off, compared with 5 percent of the girls).

Children's Views of their Home Experiences, and Competency Levels at Age 10

Children's views of their experience of life at home are associated with their competency levels. The items that showed associations with most competencies were being treated fairly, getting help if needed, and helping out. Children who said they always, or never helped out at home (presumably in terms of the time they spent on helping out), tended to score lower than those who helped out often or sometimes. The items showing the least associations with children's competency levels were being listened to at home, and being asked about school. The competencies which were most strongly associated with the items in this set were Logical Problem-Solving, Communication, and Mathematics. Most of the associations remained after taking family income and maternal qualification into account.

Table 119

Summary of Analysis of Relations Between Children's Views of Their Home Experiences, and Their Competency Levels

School Factors → Child View of Home ↓	Curiosity	Perseverance	Individual Responsibility	Social Skills Peers	Social Skills Adults	Communication	Mathematics	Fine Motor Skills	PAT	Burt	Writing	Reading Age	Logical Problem Solving	Composite	Cognitive Composite	Social Composite	Count
lots of interesting things to do		iM		♦ FM			♦ FM iM		♦ FM		♦F iM	♦	♦ FM iM	♦ F	♦ FM		9
does lots of good things with family			♦ FM			iF	♦ FM		♦ FM	♦ F		♦ FM	♦ FM	♦ FM	♦ FM		9
gets listened to at home	♦ FM					♦ FM							♦ FM				3
gets bored at home						♦ F	♦ FM iM	♦ F iF M	♦ FM	♦ FM	♦ FM	♦ FM	♦ FM iM	♦ FM	♦ FM iM		10
gets treated fairly at home		♦ F	iF	♦ iF	iF	♦ FM	♦ FM	♦ FM	♦ FM	♦ FM	♦ FM	♦ FM	♦ FM	♦ FM	♦ FM	♦F iF M	15
feels lonely at home						♦ FM	♦ FM	♦ FM	♦ FM	♦ FM		♦ FM	♦ FM	♦ FM	♦ FM		9
helps out at home		♦ FM	♦ FM	♦ FM iM		♦ FM	♦ FM	♦ F iF M	♦ FM	♦ FM	♦ FM	♦ FM	♦ FM	♦ FM	♦ FM	♦ FM	14
gets help at home if help needed	♦ FM	♦ F iF M	♦ FM	♦ F iF M	♦ FM	♦ FM	♦ FM		♦ FM	♦ FM	♦ FM		♦ FM	♦ F iF M	♦ FM	♦ F iF M	14
has friends home to play		♦ FM	♦ FM	♦ FM iM	♦ FM	♦ FM IM	♦ FM iM			♦ FM		♦ FM	♦ FM	♦ FM IM	♦ FM iM	♦ FM iM	12
gets things explained at home when needed	♦ FM	IF	IF	♦ FM	♦ FM	♦ FM								♦ F iF M		♦ F iF M	8
relatives come to the home		♦ FM	♦ FM	♦ FM		♦ FM	♦ F	♦ FM			♦ FM	♦ FM	♦ FM	♦ FM	♦ FM	♦ FM	12
gets told off at home				♦ FM			♦ F	iM	♦ FM	♦ FM	♦ FM		♦ F	♦ FM	♦ FM		9
family makes sure the child does homework			iF	♦ FM	♦ FM		♦ FM				♦ FM		♦ FM	♦ FM	♦ FM		8
family asks child about school					♦ F	♦ FM			♦ FM	♦ FM		♦ FM		♦ FM			6
Count	3	7	8	9	6	11	11	6	9	9	8	9	12	13	11	6	138

♦ = association; M= association remains after taking maternal qualification into account; F= association remains after taking family income into account; i = interaction.

On the whole, children who said that they experienced a given positive item 'often' or 'always' scored higher than those who said they experienced it 'sometimes' or 'never'. But children whose family always ensured they did their homework had lower scores than those who were often reminded, perhaps reflecting parental concern about progress resulting in a closer parental watch. Children whose parents never asked them about school, and those who never had relatives visiting, scored lower than others.

For the items which were negative, the patterns varied. Children who were always being told off had lower scores than others, whereas for children who felt lonely, it was those who

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often felt lonely whose scores were lower. Being bored sometimes was associated with higher scores than being bored always, often, or never.

Overall, it is clear that children do not need unstinting attention, or to have every minute of their day filled, to flourish.

Parental Response to Children Having Difficulties in Their Activities

We asked the parents what they would do if they saw that their child was having real difficulty with something. Three-quarters would continue as they did when the children were younger: offer some form of assistance or advice. Most of these parents (80 percent) would try to facilitate the child's efforts by asking the child if they wanted help and acting accordingly; the remainder (20 percent) would offer encouragement to the child to persevere. Fifteen percent said that they would wait for the child to ask for help, and 11 percent would show the child how to do it or do it for them. Some parents (3 percent) would seek the assistance of the child's teacher or another family member. Three percent said it depended how much time they had, or patience; 2 percent would tell the child to find something else to do; and 2 percent would do it for the child. A handful (3) said that they would be critical of the child, and the same number said that they hadn't encountered the problem—'the child just plods away'.

Things Unsettling Children

Forty-four percent of the parents had identified something which was unsettling for their child when they were near 5 years old. At older ages a significantly lower proportion, 36 percent at age 6, 32 percent at age 8, and 34 percent at age 10, were reported to have something unsettling them. At age 10, 25 percent of the parents identified one thing that was unsettling their child, 8 percent identified two things, and 2 percent identified three or four things which they thought were unsettling their child.

The things that parents reported to unsettle their children at age 10 covered broadly the same range as at ages 6 and 8. Friction at home remained the principal cause of children's disquiet, although fewer of these children were said to be upset for this reason than at age 8 (21 percent, compared with 33 percent). Chief among the other things parents thought were unsettling their child were: ill health, school itself, including concerns over changes of teachers and the impending transition to intermediate school, moving house, loss of friends through family and classroom relocations, changes in the immediate family, relations with the non-custodial parent, and bullying at home (sibling rivalry), and outside the home. A few were thought to be unsettled by changes in parental jobs, parental ill health, and changes within the extended family, including the loss of grand-parents, and the death of household pets. Some children were also said to have become fearful, to have developed phobias or to have become traumatised through having watched movies or television programmes.

Most of the children who were facing something unsettling appeared to deal with it, though not always consistently. A third of the children who were unsettled by something were said by their parents to be coping well, and 54 percent showed some variation in their coping capacity. Only 13 percent of the unsettled children were not coping at all.

Positive responses to stress were highest at age 8, when 42 percent of the children who were unsettled coped well. At age 5, only 20 percent of the children who were unsettled were said to be coping well, and at age 6, 27 percent.

Does being upset by unsettling events, or how one responds to being upset, have a bearing on competency levels? We found that children who were not coping had lower average scores for some competencies, but there were no other differences: children whose coping varied scored as well as those who were not upset by anything.

Table 120

Children's Experiences of being Upset and Children's Competencies at Age 10

Children's experiences of upsets→ Age 10 Competency↓	no upsets *mean* n=330	upsets-coping well *mean* n=57	upsets-coping varies *mean* n=92	upsets-not coping *mean* n=23	Probability of F-value from anova	Percent variance Accounted for
Perseverance	70.2	**74.5**	70.0	*57.6*	**0.007**	**2.4**
Individual Responsibility	68.8	**71.2**	67.8	*55.9*	**0.009**	**2.3**
Social Skills with Peers*	69.4	**71.0**	67.7	*57.3*	**0.0004**	**3.6**
Social Skills with Adults*	75.5	**77.2**	76.2	*64.2*	0.027	1.8
Communication*	71.0	**73.8**	72.3	*58.9*	**0.004**	**2.6**
Mathematics	63.1	**65.2**	64.0	*50.4*	0.053	1.5
Literacy —Burt Word Reading	64.0	**67.6**	66.6	*56.6*	0.042	1.6
Composite Competency*	69.1^^^^^	**70.9**	68.9	*61.2^^*	0.012	2.2
Composite Social & Attitudinal Competency*	69.9	**72.3**	69.3	*59.0*	**0.003**	**2.7**

* In these cases the squared model was a better fit. ^ one fewer in this mean, ^^ two fewer in this mean, etc. The highest scores for each competency are in bold type.

When family income was taken into account, the associations with Mathematics and the Burt Word Reading test scores were reduced to the indicative level, and were no longer evident when we took maternal qualification into account. Thus, at least in the short term, how children cope when they are upset seems to have little bearing on their cognitive competency levels.

We also looked at the reason given for children being upset, whether they were coping or not, comparing the scores of the children who were upset in relation to, say, friction at home, with those who were not upset at all. Not surprisingly, given the pattern above, there were few significant associations, and none that remained after taking family income or maternal qualification into account.

Summary

Most of the children in the Competent Children project were positive about their experiences at school and at home. They felt supported, they found interest in what they did, and they felt they were fairly treated. Most see school as a place of work as well as a place for friendship and enjoyment, and they have largely taken in the adult messages about the importance of effort in achievement. They reach out for adults when they need them, and they also call on their peers, possibly being more discerning in their friendships than when they were younger.

The children are not empty boxes waiting to be filled up with constant adult attention and activity. They experience times of boredom and bullying, and being upset, but largely cope with these, often with the support of teachers and peers.

Children's achievement levels at age 10 do show associations with their current experiences, and their feelings about their experiences. It is important that they are treated fairly at both home and school, that they are interested in what they do, and that they get help when they need it. One can be sanguine overall, but there are signs from these findings that some children do warrant more careful adult attention and thought: those who experience more intense bullying, either as bullies themselves, or bully-victims; those who are more bored than other children; and those who feel they should make more effort, but see little gain when they do.

Most children continue to need substantial adult support. Their response to difficulties usually includes finding an adult who can help. They are not assertive in the face of bullying, preferring to walk away or find adult help. They experience more bullying than teachers are aware of, however.

Where there are differences in children's experiences, they are usually related to gender, maternal qualification, or family income. Some of the patterns appear inconsistent with each other, and need further exploration. The differences associated with gender help fill out our understanding of why we see higher competency levels for girls; and the differences associated with low levels of parental education, help with our understanding of why a comparative lack of parental education appears to matter so much for children.

11 SCHOOL AND CLASS CHARACTERISTICS

In this chapter we look at some of the characteristics of the schools attended by the study children, and the characteristics of the children's classrooms.

We have not analysed every factor which we report here. The analysis is limited to factors which previous analysis in the study has shown to have links with children's competencies, or which are of perennial interest. We do not undertake any analysis of the resource aspects of schools and teachers, since measurement of these is problematic, as is the assumption of direct links with children's current competency levels (Burtless, 1996; Norton, Sanderson, Booth, & Stroombergen, 2000).

Characteristics of Schools Attended by the Competent Children Sample at Age 10

The table below shows the main characteristics of the schools attended by the study children at age 10. As at earlier ages in the Competent Children study, there is higher attendance at high socio-economic decile schools, with less than 30 percent Maori enrolment, and fewer small and full primary schools than for the Wellington region as a whole. The Wellington region itself has a higher proportion of high decile and low Maori enrolment schools than New Zealand primary and composite schools as a whole.

Table 121

School Characteristics

School Characteristics↓	Sample (n=505) %	Schools (n=178) %	Wellington Region (n=209)[86] %	National data (n=2244) %
State	78	79	76	85
Integrated	16	16	19	12
Private	7	6	5	4
Decile 1–2	11	14	16	21
Decile 3–4	13	14	17	19
Decile 5–6	9	13	14	18
Decile 7–8	19	20	19	21
Decile 9–10	48	40	34	21
Roll size				
<99	4	8	18	40
100–199	22	24	29	22
200–299	33	33	29	15
300–499	33	28	20	18
500–750	9	7	4	6
<8% Maori on roll	47	40	37	33
8–14% Maori on roll	18	19	18	16
15–29% Maori on roll	21	23	21	22
30%+ Maori on roll	15	18	24	29
Contributing	50	50	43	39
Full (incl F1–2)	46	47	53	56
Composite	4	3	4	5

- Percentage in each category may not add to 100 percent due to rounding.

Family income showed a linear relationship to the kinds of schools attended by the study children, as Table 122 shows.

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[86] In fact 6 percent of the Competent Children sample now live outside the Wellington region: 11 of the 32 have shifted to Auckland, 6 to the Manawatu/Wanganui region, 5 each to the Bay of Plenty and Canterbury, and one each to the Nelson, Northland, Southland, Taranaki, and Waikato regions.

Table 122

Family Income and School Characteristics

Family income → School characteristics ↓	Over $60k (n=202) %	$30–60k (n=184) %	< $30k (n=92) %	Sample (n=505) %
State	73	80	83	78
Integrated	17	16	13	16
Private	10	4	4	7
Decile 1–2	3	14	20	11
Decile 3–4	9	15	17	13
Decile 5–6	5	12	13	9
Decile 7–8	17	19	26	19
Decile 9–10	66	39	24	48
<8% Maori on roll	65	40	26	47
8–14% Maori on roll	12	16	28	18
15–29% Maori on roll	16	26	24	21
30%+ Maori on roll	7	18	22	15
Contributing	45	52	60	50
Full (incl F1–2)	48	47	39	46
Composite	7	1	1	4

The school characteristics we analysed in relation to children's competency levels were socio-economic decile, and school ownership.

School Socio-economic Decile

The quantitative research literature on the impact of the socio-economic mix of schools provides mixed findings. This probably reflects different measures and methods of analysis, particularly in how individual family income and prior student achievement are taken into account. While it is evident that schools with different socio-economic mix do have different patterns of student achievement, some research finds this difference to be due to differences in family income (i.e., school socio-economic mix makes no separate and additional contribution of its own), or differences in prior student achievement (Wilkinson et al, 2000). To some researchers, this distinction is a moot point: it is these very differences in student resources and experience which characterise differences in socio-economic mix. Other research, particularly in economics and political science, does show a distinct role for school socio-economic mix, after other confounding factors such as family income have been taken into account (literature reviewed in Wylie, 1998). The qualitative research literature certainly shows quite different interactions between teachers and students occurring in schools serving low income communities and schools serving middle income communities, with clear effects for the curriculum covered (Thrupp, 1999).

In this study, we have found that the socio-economic mix of the early childhood education centre attended by study children continues to have a link with their competency levels at age 10, 5 years after they left it. This link is independent of family income and maternal qualification.

Our analysis at age 8 showed that school decile continued to have an additional impact on children's Literacy, Mathematics, and Logical Problem-Solving scores after taking family income into account. When we used the children's age 5 literacy score and their school decile in a two-factor analysis of variance model, we found that school decile had a stronger influence on children's PAT Reading Comprehension scores than did their age 5 literacy scores. Adding family income at age 5 into the model showed that family income was stronger, but that school decile did play a small additional part in explaining the variance or spread of student scores, particularly differentiating children at decile 1–2 and decile 5–6 schools from others.

At age 10, the one-factor analysis showed some marked differences related to school decile, particularly separating out children attending decile 1–2 schools. There is no linear trend apparent.[87] Indeed, the study children attending decile 3–4 schools had scores which were much the same as children attending decile 9–10 schools. Children attending decile 5–8 schools had lower scores than children attending decile 9–10 schools for Literacy and Mathematics.

Table 123

School Socio-economic Decile and Competencies at Age 10

School Socio-economic Decile→ Age 10 Competency↓	1–2 *mean* n=54	3–4 *mean* n=67	5–6 *mean* n=46	7–8 *mean* n=95	9–10 *mean* n=237	Prob. Of F-value from Anova	Percent variance acct. for
*Social Skills with Peers**	64.1	**70.9**	65.0	68.6	70.0	0.004	3.1
*Social Skills with Adults**	69.3	76.3	71.6	75.2	**76.5**	0.044	2.0
*Communication**	64.1	**74.1**	70.5	69.6	72.0	0.008	2.8
Mathematics	42.0	65.4	58.7	62.2	**68.1**	0.0000000000006	12.0
Literacy —PAT Reading Comprehension	37.7^^^^^	49.2^	43.3	45.0	**53.9**	0.000001	6.6
Literacy —Burt Word Reading	54.5	64.7	60.2	63.2	**68.0**	0.000002	6.2
Literacy —writing*	65.6	71.9^	67.1	69.5	**73.3**	0.0004	4.0
Literacy —reading age	10yr6mth	11yr3mth	11yrs	11yr2mth	**11yr8mth**	0.0003	4.2
*Logical Problem-Solving**	51.5	60.3	58.8	60.7	**64.3**	0.0000001	7.4
Composite Competency*	63.2^^^^^	**70.8^^**	65.9	67.8	70.5	0.00003	5.2
Composite Cognitive Competency*	53.7^^^^^	64.0^^	59.1	61.6	**66.7**	0.000000002	9.1
Composite Social & Attitudinal Competency*	65.0	72.1	66.9	69.0	70.4	0.017	2.4

* In these cases the squared model was a better fit. ^ one fewer in this mean, ^^ two fewer in this mean, ^^^ three fewer in this mean, etc. The highest scores for each competency are in bold type.

Family Income

When we included family income in the model, we found that school decile continued to have an impact on all the competencies identified in the table above, other than reading age, and was diluted only for the social and attitudinal competencies, which are also teacher-rated. Indeed, school decile had a bigger impact than family income for Mathematics and for the three literacy tasks which were not teacher-rated.

At age 8, we found some interactions between family income and school decile. These indicated that while low income children did better for Mathematics and PAT Reading Comprehension in high decile schools than in low decile schools, high income children were largely unaffected by the school decile. At age 10, we found no interactions of this kind. Perhaps the age 8 interactions point to something which occurs in early school life, but not after some base-line skills and knowledge have been achieved. In support of this interpretation, we have the earlier evidence in this report about consolidation of performance levels by age 8.

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[87] This is consistent with other information available on student achievement in primary schools. The National Education Monitoring Project second cycle data so far completed for Year 4 students (8- to 9-year-olds) shows lower average performance levels for students at decile 1–3 schools for science, graphs, tables and maps, and art. A similar overall picture was evident from the first cycle, including reading and speaking, listening and viewing, and writing. The gap is also apparent, but less pronounced, for music and technology, but it was not evident for health and physical education.

Maternal Qualification

Introducing maternal qualification levels into the model reduced the effect of school decile for all the competencies except writing. The main effect was to reduce the differences in scores between deciles 3–10, but the contrast between children attending decile 1–2 schools and those attending decile 9–10 schools remained for Literacy, and between decile 1–2 schools and others, for Mathematics.

So there does appear to be something distinct about decile 1–2 schools that has an impact on children's learning, over and above the two consistently major contributors to children's competency levels, parental education (measured by maternal qualification in this study) and family income levels.

Why should decile 1–2 schools stand out? We know that the decile ranking is a pointer to the collective family and home resources available to students and to the schools. Collectively, the families of children at these schools have low levels of educational achievement, and very low family incomes, with higher unemployment levels than in other communities. Teachers in this study gave decile 1–2 classrooms the lowest rating for general parental support for student learning. When we asked teachers to give the lowest and highest reading ages in their class, classes in decile 1–2 schools had much the same average lowest reading age as decile 3–4 schools, but their average highest reading age was lower.

Table 124

School Decile and Reading Ages

	Lowest reading age (months)		Highest reading age (months)	
Decile	Average	s.d.	Average	s.d.
Decile 1–2	81	16.7	160	21.8
Decile 3–4	81	14.1	167	14.0
Decile 5–6	86	10.4	168	14.2
Decile 7–8	92	15.6	172	15.0
Decile 9–10	97	14.2	176	13.5

Some other differences are apparent in children's out-of-school experience. Decile 1–2 children are least likely to report reading as one of the three things they would spend most time doing outside school (13 percent). Video game playing is most likely to be reported by children in decile 1–2 schools (31 percent).

Parental Support for Children's Schoolwork

We asked the teachers of the study children to rate the general classroom parental support for their children's schoolwork, on a scale of 1–5 (1= none, 5= fantastic).

Only one classroom was rated as receiving no parental support at all. Six percent were rated at the next lowest level, 2, and 28 percent at 3. Forty-nine percent were rated 4, and 17 percent were given the top rating of 5.

Parental support at the classroom level, as gauged by teachers, followed the socio-economic mix of the students in the school.

Table 125

Average Teacher Rating for Parental Support for Most Children in Their Class

For children in classrooms at	On scale of 1–5
Decile 1–2 schools	2.9
Decile 3–4 schools	3.1
Decile 5–6 schools	3.5
Decile 7–8 schools	3.8
Decile 9–10 schools	4.1

The average ranking for children attending state or state integrated schools was 3.7, and 4.4 for the 7 percent of children attending private schools.

Family income also followed these rankings of parental support. A third of the children who were in classrooms given a ranking of 1–2 were from low income homes, compared with 13 percent who were from high income homes; conversely, only 15 percent of the children in classrooms given a ranking of 5 came from low income homes, and 45 percent came from high income homes.

Children whose mothers had no qualification were just as likely as those whose mother had some qualification to be in a classroom with the top ranking for parental support. But they were much more likely than others to be in a classroom with the lowest rankings of 1-2 (13 percent, compared with 6 percent overall).

There were associations between the level of parental support for children in the classroom and the children's scores on the cognitive competency measures. However, these were considerably reduced when family income was taken into account, confirming the considerable overlap between these two factors we reported above. When maternal qualification was taken into account, the associations with the PAT Reading Comprehension test, writing, reading age, and Logical Problem-Solving remained, but, for reasons which are not clear, not those with Mathematics and the Burt Word Reading test.

Table 126

Overall Parental Support in Classrooms and Children's Competencies at Age 10

Parental Support→ Age 10 Competency↓	little *mean* n=30	some *mean* n=141	good *mean* n=249	fantastic *mean* n=84	Prob. of F-value from anova	Percent variance acct. for
Mathematics	54.5	60.1	**65.3**	65.1	0.019	2.0
Literacy —PAT Reading Comprehension	37.9^^	46.5^^^	50.4	**53.1**	**0.004**	2.7
Literacy —Burt Word Reading	56.6	63.3	65.7	**66.7**	0.020	1.9
Literacy —writing*	64.7	70.9^	**71.9**	**71.9**	0.034	1.7
Literacy —reading age	10yr9mth	11years	**11yr7mth**	11yr6mth	**0.005**	2.5
*Logical Problem-Solving**	54.3	60.9	62.0	**63.4**	**0.010**	2.2
Composite Competency*	64.1^^	67.9^^^^	**69.8**	**69.8**	0.034	1.7
Composite Cognitive Competency*	56.1^^	62.3^^^^	64.3	**65.1**	**0.008**	2.4

* In these cases the squared model was a better fit. ^ one fewer in this mean, ^^ two fewer in this mean, ^^^ three fewer in this mean, etc. The highest scores for each competency are in **bold** type.

School Ownership

One of the school characteristics that some have thought should influence student achievement is the type of ownership of the school. A review of the international research (Wylie, 1998) indicates that there is little clear evidence that private schools provide additional academic benefits for most children, though there are data suggesting that those who can gain from the smaller classes, greater individualised attention, and the usually higher socio-economic mix offered by private schools are students who are initially low-achieving, from low income homes, and from minority ethnic groups.

Previous phases of the Competent Children project showed that while we found higher reading scores for children attending private schools, these disappeared or weakened considerably once we took family income and maternal education into account. This is consistent with the overseas research.

In this phase we found that children who attended private schools also achieved higher reading scores than those attending state schools.[88] After allowing separately for family income and maternal qualification, the difference was around 9 percentage points on the PAT Reading Comprehension test, and 8 percentage points on the Burt Word Reading test. The reading measures were the only competencies to show any difference related to school ownership, though the private schools were able to offer smaller classes on average, a higher socio-economic mix, and greater parental support at the classroom level.

This lack of difference is consistent with the lack of difference associated with school ownership in parents' and children's reports of their school experiences, or teachers' views of their relationships with parents and the support they gave their child.[89]

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[88] There were no differences between private and state-integrated schools (mainly Catholic), or between state-integrated schools and state schools.

[89] Only one small statistically significant difference was apparent: 11 percent of private school students said they were always restless, compared with 3 percent of students at state and state-integrated schools.

Classroom Characteristics

Class Size

The average class size was 28 children, the same as it had been when the study children were aged 8. The smallest class size was 9, and the largest, 56 (taught by two teachers). Average class size was smaller in private schools (24 children, compared with 28 for state integrated schools, and 29 for state schools). There were no differences in average class size related to school decile.

One-factor analysis showed no relationship with class size. This is a somewhat different result from the current research on class size, which is showing some benefits, mainly for children from low income homes who are in consistently small class sizes in their early school years (Jacobson, 2001; Viadero, 2001). An analysis using longitudinal data from the Christchurch Health and Development study also finds higher growth on the Burt test if class size remains consistently small (and vice versa, with students in persistently large classes from age 8 to 13 having somewhat smaller gains than others on the Burt (Boozer & Maloney, 2001).

There are several likely reasons for our absence of a finding here. First, we used current class size, and some of the study children were interviewed close to the start of the school year, when they would have had little time in the classroom. However, more importantly, few of the study children were in classes which came close to 15 students, the class size which emerges from the research as particularly beneficial. Only 13 students were in classes with less than 20 students, making it difficult for sound comparisons to be made.

Proportion of Children with English as a Second Language in the Class

The average number of children with English as a second language (ESL) in the study children's classes was 3. Some classes had none of these children; several had 29. Classes in decile 1–2 schools were most likely to include these children, with an average of 9 per class, compared with 4 in decile 3–4 schools, and around 2 for decile 5–10 schools. State integrated schools had an average of 4 ESL children in the study children's classes, compared with 2 in state school classes, and 1 in private school classes.

There were no associations found between children's competency levels and the proportion of children with ESL in their class.

Year Level

Fifty percent of the study children were in Year 6 and 49 percent in Year 5, at the time we interviewed their class teacher. Two children were in Year 4 and 3 in other classes.

Twenty-seven percent of the Year 5 students were aged less than 10, compared with 9 percent of the Year 6 students. There were no gender, ethnic, or family income differences related to year level.

Composite and Single-level Classrooms

Seventy-four percent of the children were taught in a composite class. Combinations of shared classrooms ranged from Year 4 upwards. Fifty percent of the students were in composite Year 5 and 6 classes, and 23 percent in other groupings (mostly Years 4 and 5, or

Years 4, 5, and 6). Twelve percent attended classes made up of Year 5 students only, and 14 percent of Year 6 students only.

Maori children were more likely to be in composite classes other than Years 5 and 6.

The children attending private schools were more likely to be in single level classes (76 percent), as were those attending decile 5–6 (43 percent) and decile 9–10 schools (33 percent). Children attending decile 1–6 schools were most likely to have composite classes other than Years 5 and 6.

We did not analyse year level or class composition in relation to students' competency levels.

Variations in Classrooms and Numbers of Teachers

Only 6 percent of the children were taught in open plan classrooms.

Sixty-four percent of the children had a teacher other than the classroom teacher for one or more subjects. Mathematics was the subject most likely to be taught by another teacher. Seventeen percent of the children at age 10 had Mathematics taught by a teacher other than their class teacher. Smaller proportions of students, no greater then 5 percent, attended a range of classes taught by teachers other than their class teacher, including science, technology, the arts, sport and languages.

Use of a range of teachers appeared to be greatest for children in private schools (94 percent, particularly for music or art, sport, and information technology), and in decile 3–4 schools, with 31 percent of these students taught Mathematics by another teacher, 13 percent language, 13 percent music or arts, and 9 percent technology.

We did not analyse this material in relation to student competency levels.

Class Student Turnover

Most of the study children could expect to be with the same classmates for the year. Sixty-two percent of the students were in classes that had a turnover rate of less than 5 percent. A third were in classes where the turnover rate was between 5 and 20 percent. Four percent were in classes with a turnover rate of 21–40 percent, and 1 percent, in classes with turnover rates above that. Eleven percent of the children in decile 1–2 schools were in classes with a turnover of 21 percent or more.

Analysis using two categories, a student turnover rate of less than 5 percent, and one with 5 percent or more, showed a significant association only with Mathematics, with students in classes with the lower student turnover having an average score 6 percent higher than those in classes with higher student turnover. There were also indicative associations with PAT Reading Comprehension and writing, again favouring those in classes with lower turnover. However, after allowing for family income and maternal qualification, only the association with Mathematics remained, albeit reduced. Interestingly, higher student turnover rates in the child's class did not affect those whose mothers had a tertiary or university education.

Summary

Our data continue to show that family income influences the kind of school children attend. But our analysis shows that, for the most part, this does not matter, with some noteworthy exceptions.

Once the confounding factors of family income and maternal qualification have been included in the analysis, children attending decile 1–2 schools do have lower scores for Mathematics and the Literacy measures. But children in decile 3–4 schools had scores much the same as those in decile 9–10 schools, and both of these tended to be higher than those of children in decile 5–8 schools.

Thus it would appear that the socio-economic characteristics of the children served by a school do matter over and above individual family characteristics,[90] but, like family income levels themselves, they do not follow linear trends. It is those who have fewer resources and experiences than others, and whose peers at school are in much the same boat, who appear to be disadvantaged. Parental aspirations for children in decile 1-2 schools were less likely to specifically mention tertiary education. However, teacher views of students' ability to achieve their full educational potential were no different for students in decile 1-2 schools than for others—though we did not ask what they thought the children's educational potential might be.

There is a suggestion in the material that children in decile 9–10 schools are more advantaged; but in this phase of the study, their performance was matched by children in decile 3–4 schools. This is a most intriguing and inspiring finding. We only wish we had qualitative, observational material about the teaching and programmes in these schools to offer. Certainly, if these children from these schools continue to match the performance of children in decile 9–10 schools at age 12, further follow-up work would be highly desirable.

Low income children are more likely to find themselves in classrooms whose teachers perceive that there is low support generally from children's homes for their learning. Children in these classrooms also scored lower for some of the literacy measures and Logical Problem-Solving, even after the confounding factors of family income and maternal qualification were taken into account. This is consistent with the economic and political science research literature on peer-effects.

While private schools have more children from high income homes than other schools do, the higher scores on the reading measures for children in private schools were not accounted for by family income or maternal education. Since there has been a trend for higher performance on reading measures (the Burt Word Reading test at age 6, the PAT Reading Comprehension test at age 8) by private school students in the study, this would suggest that private schools may put more emphasis on reading in their programmes than other schools do.

Other school and class characteristics examined here showed no relation with children's competency levels. This may be because we examined only current characteristics—we will test this by doing more analysis of cumulative trends when we come to analyse the age 12 material—or because there is insufficient range of the factors (e.g. class size) in our sample for analysis; or because they are not of deep significance; or because teachers respond to them and work to mitigate any negative effects.

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[90] Those who adhere to hierarchical linear modelling would argue that further analysis using income data for all the school's children, not just a general decile summation, should be done; this would be interesting to do, but was not possible with our data.

12 LINKS BETWEEN HOME AND SCHOOL

Children's Attitudes to School at Age 10

Most children felt enthusiastic about school, according to their parents' report: 70 percent, slightly up on age 6 (62 percent), and much the same as at age 8 (71 percent). Thirteen percent were described as being matter of fact and simply accepting school attendance as part of their daily routine, and 9 percent had mixed feelings, sometimes enthusiastic, sometimes not. Four percent of the children were unhappy with school, and another 3 percent had taken a while to settle but were now enjoying themselves. One percent were bored.

There were no differences in children's reported attitudes to school associated with maternal qualification levels, ethnicity, or type of family.

Children from high income homes were more likely to be reported as showing enthusiasm (78 percent, compared with 63 percent of children from middle and low income homes), and less likely to be matter of fact about it (9 percent, compared with 16 percent of children from middle and low income homes).

Girls were more likely to be enjoying school than boys (80 percent, compared with 62 percent). Boys were more likely to have mixed feelings about school (11 percent, compared with 6 percent of girls) or to dislike school (6 percent, compared with 2 percent of girls).

Children who had had a change of schools were more likely to have a matter of fact attitude towards school (14 percent, compared with 6 percent of those who remained in the same school between ages 8 and 10).

Children who enjoyed reading were more likely to be enthusiastic about school: 77 percent, compared with 59 percent of those whose parents thought they had mixed feelings about reading, and 44 percent of those who did not enjoy reading. A similar pattern was evident for enjoyment of writing: 82 percent, 65 percent, and 50 percent respectively. But there were no associations between children's enjoyment of numbers and their feelings about school.

We did not analyse the children's current level of enthusiasm about attending school as reported by parents in relation to the children's competency levels at age 10, since we could draw on more specific aspects of school experience as reported by the children themselves. We did look back to the parents' reports at age 6 of children's initial response to school, since there is continued interest in the quality of children's transition from early childhood education to school, and any long term impacts that can arise from children's initial feelings about school when they start their long school career.

The next table (Table 122) shows some interesting associations. Children who showed enthusiasm tend to score more highly than those who took a while to settle, or who were matter of fact rather than keen. But children who were clearly unhappy about starting school do not show lower scores than others at age 10—indeed, they tend to score as well as those who were enthusiastic. Some caution is needed, due to the small number of children involved (10). But it may be that children who are unhappy are not unhappy about the work of school, but dislike the way it occurs. It may also be that initial unhappiness which is reported by parents has given clear signals for adult intervention and support at a time when it could be effective.

Table 127

Initial Response to School and Children's Competencies at Age 10

Child's initial response to school→ Age 10 Competency↓	enthusiasm *mean* n=170	matter-of-fact *mean* n=29	while to settle *mean* n=63	unhappy *mean* n=10	Prob. Of F-value from anova	Percent variance acct. for
Curiosity	**65.3**	58.3	58.7	57.9	0.028	3.3
Perseverance	**73.3**	66.4	63.7	66.2	**0.005**	**4.6**
Individual Responsibility	**70.9**	64.7	61.4	67.0	**0.006**	**4.6**
*Communication**	**73.5**	69.8	63.3	63.9	**0.00006**	**7.9**
Mathematics	65.6	52.9	59.7	**69.5**	0.016	3.7
Literacy —PAT Reading Comprehension	52.5^^^	41.2^	42.1	**55.9**	**0.002**	**5.5**
Literacy —reading age	**11yr8mth**	10yr8mth	11yr2mth	11yrs	0.018	3.7
*Composite Competency**	**70.8^^^**	65.4^^	64.6	67.6	**0.0004**	**6.6**
Composite Cognitive Competency*	65.2^^^	58.0^^	60.6	**66.9**	0.012	4.0
Composite Social & Attitudinal Competency*	**71.6**	65.9	63.9	66.0	**0.001**	**5.9**

* In these cases the squared model was a better fit. ^ one fewer in this mean, ^^ two fewer in this mean, ^^^ three fewer in this mean, etc. The highest scores for each competency are in **bold type**.

The child's initial response to school had stronger associations with Curiosity, Perseverance, Individual Responsibility, and Communication after taking family income into account. Although family income had stronger associations than the child's initial school reaction for Mathematics and literacy, the percentage point difference increased slightly between those who were enthusiastic, and those who were lukewarm or took time to settle in, after taking family income into account.

By contrast, fitting maternal qualification to the model reduced the associations with Curiosity, Perseverance, Individual Responsibility and Communication. However, it also slightly strengthened the associations of initial school reaction with Mathematics and literacy.

Thus children's initial reaction to school, though having some relation to children's family income and parental educational levels, does make a contribution of its own to children's competency levels 5 years later. The transition to school warrants policy and early childhood education/school attention, to ensure that the school environment and work is not so foreign that children take a while to settle in, or so undemanding that they can remain neutral.

Attendance

Most children in the study had good attendance records. Teachers reported only 1 percent as having poor attendance records, and a further 6 percent as having only satisfactory attendance. Illness and poor health were the main reasons teachers gave for attendance being poor or only satisfactory. Family commitments were also mentioned, along with lack of supervision at home, family mobility, and a lengthy absence due to the child accompanying the family on holiday during term time. Two children did not like school at all.

Attendance records were not linked to family income or maternal qualification; but they were linked to school decile, with 11 percent of the children attending decile 1–2 schools having only satisfactory or poor attendance, declining to 8 percent of the children in decile 3–6 schools, and 5 percent of those in decile 7–10 schools.

We analysed attendance in relation to the children's competency levels at age 10 in two categories only: good, and less than good (poor or satisfactory). Children whose attendance was less than good had lower marks for Perseverance, Individual Responsibility, Social Skills with Peers, and Curiosity—but not for the academic competencies. When we allowed separately for family income and maternal qualification, the associations with Perseverance and Individual Responsibility remained (a difference of 10 percentage points for Perseverance, and 8 percentage points for Individual Responsibility, when we took family income into account; and a difference of 8 and 7 percentage points respectively when we took maternal qualification into account).

Mobility between Schools

Sixty-eight percent of the study children were still in the same school they started in. Twenty-three percent were at their second school by age 10, and 7 percent at their third school. Seven children (1 percent) had attended 4 schools, 3 children 5 schools, and another child 10 schools by the time they had reached their fifth year of formal education.

Family income levels were reflected in the patterns of mobility between schools. Among those who had stayed at the same school since age 5, only 18 percent were from low income families; but 45 percent of those who had attended 3 schools, and 70 percent of those who had attended 4 or more schools were from low income families.

Mobility between schools was unrelated to the decile of children's current school.

Eighteen percent of the study children had changed schools since age 8. Shifting house was the main reason for the change of school (given by 62 percent of the parents of children who changed school). Fifteen percent of the parents whose child changed school between age 8 and age 10 were attracted by the current school's reputation, 7 percent said that the current school's curriculum had led to their moving the child, and another 7 percent of parents mentioned the current school's disciplinary climate and standards of behaviour. Thirteen percent of the parents also said that they changed their child's school to suit their own employment circumstances, 8 percent gave other personal reasons, and 7 percent said that they had chosen a school attended by the child's friends. Differences in class size (5 percent), school facilities (4 percent), and school type (3 percent) were also factors influencing the choice of a new school.

Change of school was more likely to be evident for children who were now attending private schools, with 36 percent of this group moving to their current school between the ages of 8 and 10, compared with 18 percent of the children currently attending a state school, and 10 percent of those currently attending a state–integrated school.

Twenty-three percent of the girls changed school between age 8 and 10, compared with 13 percent of the boys. Their reasons for changing were much the same, but boys were more likely to have changed to schools with better reputations (20 percent, compared with 13 percent of girls).

Mobility between schools did have some associations with some competencies, largely at the indicative level. Some care is needed because of the small number of children who had attended 4 or more schools, but the analysis suggests that these children had lower scores for Curiosity, Communication, writing, and reading age. Children who had remained at a single school had higher scores for Curiosity.

Table 128

Mobility Between Schools and Children's Competencies at Age 10

Number of schools age 5–10→ Age 10 Competency↓	one *mean* n=344	two *mean* n=116	three *mean* n=34	4 or more *mean* n=11	Prob. of F-value from anova	Percent variance acct. for
Curiosity	**65.7**	61.1	57.8	58.0	**0.009**	**2.3**
Communication*	**72.2**	68.8	70.0	59.1	0.032	1.7
Literacy —writing*	71.6	70.4^	**72.2**	59.8	0.037	1.7
Composite Competency*	**69.7^^^^^**	68.1^^	67.5	60.6	0.029	1.8
Composite Cognitive Competency*	**64.2^^^^^**	62.3^^	62.7	54.4	0.10	1.2
Composite Social & Attitudinal Competency*	**70.4**	68.5	67.6	59.8	0.041	1.6

* In these cases the squared model was a better fit. ^ one fewer in this mean, ^^ two fewer in this mean, ^^^ three fewer in this mean, etc. The highest scores for each competency are in **bold type**.

Seventy-three percent of the boys remained in the same school till they were 10, somewhat more than the 62 percent of girls still in their original school. This may explain why there is no strong relationship between children's competency ratings and school mobility, though a more likely explanation is the fact that in general school mobility was not high for the children still in the sample at age 10; and though children from low income families were more likely than others to move schools, there was still a reasonably high rate of mobility for other children.

However, overseas research also offers mixed results in relation to the impact of student mobility between schools and their achievement. Strand (2000) analysed student mobility and achievement results for over 6,000 English students at age 7, and found that after taking into account the social characteristics of the more mobile children, and their assessment results at age 4, frequent mobility had only a small direct association, and only with Mathematics, not literacy. Mantzicopoulos & Knutson (2000) found in their sample of 92 Head Start children (all low income) in the USA that while children who moved school most over the first three years of school were also those who had lower initial achievement levels before starting school, a negative association between school mobility and children's achievement levels was still evident.

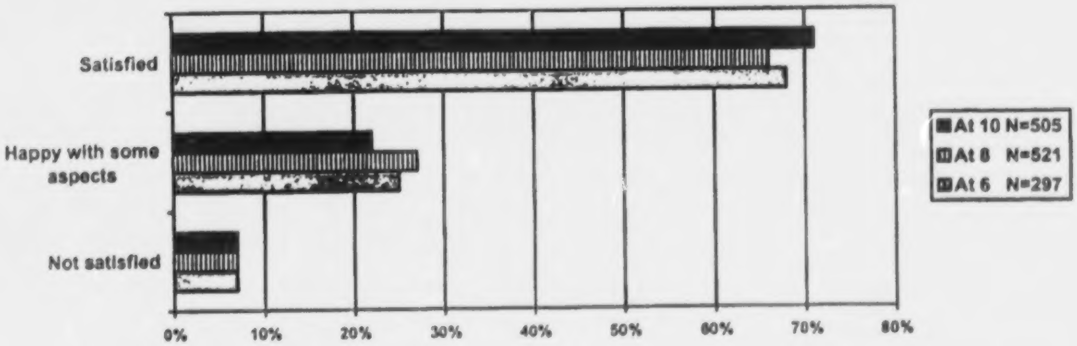
After taking family income into account, we found that school mobility continued to show associations with these children's competencies, as outlined above. Maternal qualification had a stronger impact than school mobility, reducing its associations with these competencies, but not over-riding them.

Parental Satisfaction with Their Child's Progress at School

Parental views on their child's progress at school remained largely positive, with a small increase in the proportion of those who were satisfied without qualification.

Figure 12

Parental Satisfaction with their Child's Progress at School



Parents' satisfaction with their child's progress at school was unrelated to family characteristics, school decile or ownership, change of school between the ages of 8 and 10, or the number of schools attended since the child was 5. It was also unrelated to teacher views of their relationship with the child's parents and parental involvement in the school, with the exception of regular talks with the teacher (which were most likely for those who were dissatisfied with their child's progress – 61 percent, compared with 47 percent of those who were satisfied). Most of the dissatisfied parents had worked with the teacher to solve their child's problem (75 percent).

Parents who were unsatisfied with their child's education were more likely than those who had mixed feelings to mention their child's lack of progress or confidence/happiness about school, their being in a composite class, and the size of the class (lack of individual attention). Those with mixed feelings were more likely to find their child was bored or not being sufficiently extended, or to mention doubts about a particular teacher, or behaviour issues at the school.

The desire to make changes in the child's classroom was linked to parental dissatisfaction: 47 percent of those who were dissatisfied or had mixed feelings, compared with 28 percent of those who were satisfied with their child's progress.

As might be expected, parents who reported that their child enjoyed school were much more likely to say that they were satisfied with their child's progress (76 percent, compared with 59 percent of those who had some misgivings, and 44 percent of those who were dissatisfied).

Parental views of their child's enjoyment of reading were reflected in their satisfaction with their child's school progress. Seventy-nine percent of those who thought their child enjoyed reading were satisfied with their child's progress, compared with 57 percent of those who thought their child's enjoyment varied, and 50 percent of those who thought their child did not enjoy reading. Similar patterns were evident for children's enjoyment of writing, using numbers, and working with patterns, but not for their enjoyment of measuring things.

There were some links, too, with children's views of school. Children whose parents were not satisfied with their child's school progress, or had some doubts, were more likely to give a lower rating to these items related to school:

- I do interesting things (33 percent said sometimes or never, compared with 21 percent of those whose parents were satisfied with their progress)
- Teachers help me do my best (18 percent said sometimes or never, compared with 7 percent)
- My teacher tells me when I do good work (18 percent said sometimes or never, compared with 9 percent)
- I am treated ok (42 percent said always, compared with 61 percent)
- I keep out of trouble (26 percent said always, compared with 39 percent).

But they were no more likely than children whose parents were satisfied with their progress to think that they could do better work if they tried, to say they got bored, or to enjoy themselves.

At age 8, we found that parents of boys were less likely to express satisfaction with their progress; but at age 10, there were no differences related to the child's gender. Boys' parents were more likely to have worked with their son's teacher to resolve a problem he was experiencing.

Parental satisfaction with their child's progress did not reflect teacher views of their child's overall achievement level: 50 percent of the parents who were not satisfied with their child's progress had children whom their teachers identified as having a very good or excellent level of achievement, compared with 28 percent of those who were satisfied. This pattern differs from previous ages, where parents who were satisfied were more likely to have children whose achievement was rated highly by teachers.

Parental Satisfaction with Children's Progress at Age 6 and Children's Competencies at Age 10

We did not analyse parents' current satisfaction with children's progress, largely because our analyses in previous years had shown that there were consistent associations: children whose parents were satisfied with their progress scored more highly than others. However, there were no significant differences between those whose parents were dissatisfied, and those who had some reservations, for Mathematics, Social Skills with Peers, Social Skills with Adults, or Fine Motor Skills.

In looking for factors which might contribute to children's competency levels at age 10 (rather than reflect them), it seemed more useful to return to parental satisfaction levels when the study children were aged 6, at the close of their first school year. One-factor analyses showed no associations, either significant or indicative. However, when we fitted family income and maternal qualification separately into the model, some differences did emerge. Family income and maternal qualification had stronger impacts than parental satisfaction levels at age 6, but parental satisfaction levels did appear to be making a contribution over and above family income and maternal qualification to Perseverance, Mathematics, the Burt Word Reading test, and reading age.

Of particular interest are indicative patterns showing that parental dissatisfaction levels at age 6 are not associated with lower scores at age 10 for reading age, Individual Responsibility, and Social Skills with Adults for the children whose mothers have a university education; but they are for others, particularly children whose mothers have no qualification, or a mid-school qualification.

These patterns may point to early parental intervention by parents who are confident with the education system. This would be consistent with the research literature on the more assertive role often taken by highly-educated parents in regard to their child's progress (e.g. Lauder & Hughes et al, 1999). The competencies for which such interventions may have made a difference are teacher-rated.

Parents and Teachers

Home Support for Children's Learning—Teachers' Perspectives

We asked teachers to rate on a 5-point scale the degree of support that the study children were receiving at home for their schoolwork. Forty-three percent of children were said to be receiving the maximum amount of support, 29 percent very good support, and 14 percent an average amount of support. Seven percent of the children were said to be poorly supported at home. Only 1 percent of the children were said to receive no support at home for their schoolwork. These views were unrelated to family income levels.

There was no relation between the teacher's overall view of a child's home support and their view of their relationship with the child's parents, the parent's involvement in the school, or their view of their child's progress at school. Parents whom the teacher felt gave little home support were just as likely to help at the school, or talk regularly with the teacher, as those whom they felt gave the best possible support. They were just as likely to feel comfortable talking with the teacher, to sort out with the teacher any problems their child was experiencing, or want to change something in the classroom.

However, there was some relation between teacher views of children's home support and the children's views of their home support. Twenty-one percent of the children whose parents' home support was rated low by teachers said their home was only sometimes or never a place where their family made sure they did their homework, compared with 4 percent of those whose parental home support was given the highest rating by teachers, and 10 percent of those with a middle rating. Yet only those children with the highest rating for parental support at home stood out from others in relation to the item *home is a place where my family asks me about school*, and there was no difference related to children's perceptions about whether their parents were interested in what they did at school.

Children whose home support was rated 5 out of 5 by teachers had higher scores than other children for all the competency measures. It may well be that teachers are simply assuming high home support for high achieving children who are also socially adept and show the kinds of attitudes, such as Perseverance and Individual Responsibility, which enable school work.

Table 129

Teacher's View of Family Support for Schoolwork and Children's Competencies at Age 10

Teacher's view of family support for schoolwork→ Age 10 Competency↓	little/ none *mean* n=42	some *mean* n=72	good *mean* n=145	fantastic *mean* n=218	don't know *mean* n=29	Prob. of F-value from anova	Percent variance acct. for
Curiosity	57.1	60.3	59.3	**70.5**	57.8	0.0000000008	10.1
Perseverance	54.5	61.4	66.7	**78.0**	70.7	0	16.1
Individual Responsibility	51.2	57.6	66.1	**76.7**	65.3	0	20.3
*Social Skills with Peers**	59.1	64.5	68.9	**71.9**	68.1	0.0000000005	10.2
*Social Skills with Adults**	64.8	68.9	71.0	**82.0**	73.6	0.000000000000008	14.2
*Communication**	59.3	65.0	67.8	**77.6**	66.3	0	15.8
Mathematics	53.6	56.5	63.4	**67.5**	57.1	0.00008	4.7
Fine Motor Skills*	81.2	85.6	85.5	**88.0**	84.1	0.009	2.6
Literacy —PAT Reading Comprehension	35.7^	41.0^^	49.4^^	**54.0^**	47.6	0.0000001	7.4
Literacy —Burt Word Reading	53.1	60.7	66.8	**67.2**	60.2	0.000002	6.1
Literacy —writing*	63.0^	70.2	71.2	**73.2**	68.2	0.0001	4.5
Literacy —reading age	10yrs	11yrs	11yr6mth	**11yr9mth**	10yr9mth	0.0000007	7.5
*Logical Problem-Solving**	52.3	57.0	62.0	**64.2**	60.3	0.0000009	6.5
Composite Competency*	59.1^^	63.7^^	67.4^^	**73.8^**	65.9	0	20.3
Composite Cognitive Competency*	54.3^^	59.1^^	64.1^^	**66.6^**	59.9	0.0000004	7.8
Composite Social & Attitudinal Competency*	57.7	62.9	66.6	**76.1**	67.0	0	22.9

* In these cases the squared model was a better fit. ^ one fewer in this mean, ^^ two fewer in this mean, ^^^ three fewer in this mean, etc. The highest scores for each competency are in **bold type**.

Children whose home support received the highest rating stood out for Communication and Curiosity; otherwise the differences between the scores tend to differentiate each of the ratings for home support from each other. Fitting family income and maternal qualification separately showed home support retaining its own association with children's competency levels.

Most parents said that they were comfortable in talking to the child's teacher about their child (89 percent). Only 2 percent (10 parents) were not, and another 7 percent (36 parents) were comfortable about some aspects, but not others. Most parents who were uncomfortable or not at ease talking to their child's teacher had raised problems about the child's progress with the teacher. A handful (4) had not.

The main reasons for feeling uncomfortable in talking to the child's teacher about the child were that the parent had no confidence in the teacher, or that the parent had no time to get to know the teacher. A few parents also mentioned constant change of teacher, or their own lack of confidence in approaching their child's teacher.

Parents were less likely to work with their child's teacher to resolve problems encountered by their child at age 10 than at age 8: 50 percent, compared with 65 percent. Only 2 percent of parents felt such problem sharing would not help their child. Another 2 percent said that although they had worked together, they had not succeeded in resolving the problem.

At age 10, children's happiness and social well-being was less likely to be raised by parents (26 percent, compared with 38 percent at age 8 and 34 percent at age 6). Academic progress was a focus for 27 percent of the parents, slightly less than at age 8 (32 percent) but much the same as at age 6. Their child's health problems were a concern for some parents (4 percent). Four parents had resolved an unspecified problem, or had had the problem resolved by parent education.

Parents of boys were more likely to say that they had worked together with their child's teacher on problems encountered by their child (57 percent, compared with 43 percent of girls' parents). Boys' parents were also more likely to discuss academic progress (34 percent, compared with 19 percent of girls' parents). Discussion of social-emotional problems was similar for both boys and girls.

Parental comfort in talking to their child's teacher, working on problems together, and the kinds of problems discussed with the teacher showed no clear differences related to school decile.

Teachers' Relations with the Children's Parents

Forty-eight percent of the teachers described their relations with the child's parents as excellent or very good, and 28 percent said that they had a good relationship. Twelve percent said that relations were satisfactory. Some teachers (10 percent) felt that they did not know the child's parents well, chiefly because our interview took place at the beginning of the school term. However, some teachers had never met the parents. Only 1 percent felt that they were on difficult terms with the child's parents. The overall picture was much the same as at age 8.

Difficult relationships were more likely in decile 1–2 schools (8 percent, compared with 1 percent of relationships in decile 3–10 schools).

Teachers' views of their relationship with children's parents showed some association with their ratings of children's social and attitudinal competencies, but less so with their literacy and Mathematics competency scores. These associations remained after accounting separately for family income and maternal qualification. Generally, children whose teachers felt they had a very good or excellent relationship with their parents scored highest, and those whose relationships were satisfactory or difficult, or where there was no relationship because the teacher had never met the parent, scored lowest. Thus it seems important for a child's growth that there be some positive relationship between the adults who share responsibility for the child.

Table 130

Teacher's View of Their Relationship with Parent and Children's Competencies at Age 10

Teacher's view of relationship with parent→ Age 10 Competency↓	v.good/ excellent *mean* n=244	good *mean* n=142	satisfactory to difficult *mean* n=71	none *mean* n=49	Prob. Of F-value from anova	Percent variance acct. for
Curiosity	**68.3**	61.8	58.4	56.7	**0.0000005**	6.2
Perseverance	**73.4**	70.2	63.1	63.9	**0.00009**	4.1
Individual Responsibility	**72.7**	67.4	59.4	60.7	**0.00000003**	7.3
Social Skills with Peers*	**70.6**	69.6	63.8	64.3	**0.00002**	4.7
Social Skills with Adults*	**78.9**	74.2	67.7	69.9	**0.000002**	5.7
Communication*	**74.2**	70.3	65.6	63.4	**0.000004**	5.4
Mathematics	**65.8**	60.5	60.8	59.3	0.058	1.5
Literacy —PAT Reading Comprehension	**52.4^^**	44.7^	49.5^^^	44.1	0.003	2.8
Literacy —reading age	**11yr7mth**	11yr4mth	11yrs	10yr9mth	0.010	2.2
Composite Competency*	**71.5^^**	67.7^	65.5^^^	64.1^	0.0000003	6.5
Composite Cognitive Competency*	65.2^^	61.6^	63.2^^^	59.8^	0.017	2.0
Composite Social & Attitudinal Competency*	73.0	68.9	63.0	63.2	**0.0000000007**	8.6

* In these cases the squared model was a better fit. ^ one fewer in this mean, ^^ two fewer in this mean, ^^^ three fewer in this mean, etc. The highest scores for each competency are in **bold type**.

There was a slight drop in the proportion of mothers whom teachers reported seeing regularly (38 percent, compared with 43 percent at age 8). Thirty-three percent sometimes saw the child's mother, and 18 percent had met the child's mother only rarely. Ten percent never saw the child's mother (6 percent at age 8).

Patterns of contact with the children's fathers stayed much the same between ages 8 and 10. At age 10, teachers had not met 39 percent of the study children's fathers, and had met a further 24 percent on rare occasions. Only 10 percent of fathers were seen regularly by their child's teachers.

What is of particular interest is that the non-resident fathers of children who were in what were now one-parent but formerly two-parent families were just as likely to be seen by teachers as those in original two-parent families. But only 10 percent of fathers had regular contact with their 10-year-old's teacher, compared with 38 percent of the mothers; and teachers in the study had never met 38 percent of the children's fathers, compared with only 10 percent of their mothers. Fifteen percent of teachers reported meeting other family members, with this being most likely in decile 1–2 schools (24 percent, declining to 11 percent in decile 9–10 schools).

There were no income-related or ethnic differences in the frequency with which teachers reported meeting parents.

Parental Involvement in their Child's School

Most parents (93 percent) reported some involvement with their child's school. There are some marked differences between the kind of involvement they reported when their child was aged 8, and their current involvement when the child was aged 10, as Table 131 shows. Parents of 10-year-old students are much less likely to provide voluntary support in the classroom. This might reflect changes in paid employment patterns. More mothers were now employed for longer hours: 72 percent for more than 20 hours per week, compared with 57 percent when the study children were aged 8. The proportion of mothers employed for 10 hours or less declined from 22 percent at age 8 to 13 percent at age 10.

The shift away from voluntary classroom help could also reflect changes in what happens in classes, as children can work more independently, and 10-year-olds' feelings about having their parents in their classes. Perhaps related to the loss of regular contact with the child's teacher through classroom work, the proportion of parents reporting regular talks with the teacher has increased dramatically.

Table 131

Parental Involvement at Their Child's School Ages 8 and 10

Parental Involvement	(N=521) %	(N=505) %
Voluntary work at school – non classroom	29	46
Regular talks with teacher	11	46
Attendance at school meetings and functions	8	21
Voluntary work at school – classroom related	42	17
Irregular contact/very little	23	14
Board of Trustees/Parents' Association	13	13
No involvement	9	7
Paid work at school	4	5
Partner is involved	2	1

Parental involvement in their child's school was generally unrelated to the characteristics of that school. Parents who had mixed feelings about talking with their child's teacher had much the same pattern of parental involvement in the school as those who were comfortable talking to the teacher. Parents who were not comfortable with their child's teacher or who had never met the teacher were less likely to take part in voluntary work, have regular talks with the teacher, or take any problems the child was experiencing to the teacher.

Parental involvement in their child's school was generally unrelated to family income, with the exception of meeting attendance and membership of the board of trustees or parents' association. Parents from low income families were less likely to have this kind of involvement.

There was a steady but small linear progression of some regular parental involvement in their child's school related to maternal qualification, from 73 percent of parents from families where the mother had no qualification to 83 percent of parents from families where the mother had a university qualification. There was no relation with ethnicity.

We did not analyse specific forms of parental involvement in relation to children's competencies.

Parental Desires for Change in their Child's School

We asked the parents we interviewed if there was anything that they would like to change about what happened in their child's school. Just over a third of the parents (34 percent) said that there were certain aspects of their child's schooling or school experiences that they would like to change. Seven percent said they were unable to comment, either because they did not know what went on in the child's classroom, or it was too early in the school year to be able to say anything.

Thirty-five percent of the parents who thought change would be desirable mentioned improvements to the school's programme content and classroom resources. About a quarter of the parents mentioned class size or the school's disciplinary or social climate, citing concerns about children's behaviour, such as teasing or theft of their child's property. Eleven percent had encountered difficulties in their dealings with their child's teacher and 6 percent mentioned that their child did not relate well to the teacher. Classroom stability, especially a high rate of teacher turnover, was a concern for 8 percent of parents. Other concerns mentioned by parents related to the location and upkeep of the school and the size and location of classrooms. Teacher professional standards were also raised by a small handful of parents.

Children's Sharing of School Experiences with Parents

Only 7 percent of the study children said that they never talked to their parents about school. Thirty-six percent said that they did sometimes, and 56 percent reported talking regularly to their parents about their school experiences. Sixteen percent of the children of mothers with no qualifications said they did not talk to their parents about school, compared with 8 percent of the children of mid-senior school-qualified mothers, and 4 percent of the children of tertiary and university-qualified parents.

Of the children who talked about school with their parents, only 18 percent said that they told their parents about everything that happened. Around half (55 percent) said that they talked about their schoolwork, and 30 percent reported what was happening in the playground. Twenty-three percent reported interesting or unusual events, 15 percent told their parents about incidents such as fighting or bullying, and 10 percent reported only the good things. Discussion of interesting or unusual events reflected maternal qualification levels, rising from 14 percent of children of mothers with no qualifications to 32 percent of those whose mothers were university-qualified. Children attending decile 1–2 schools were less likely to talk about school work (37 percent).

Most children (79 percent) felt that their parents were interested in what they were doing at school. Seventeen percent felt that their parents were sometimes interested, and 3 percent said that they didn't know whether their parents were interested or not. Only 4 children (1 percent) said that their parents had no interest at all in what was going on at school.

School characteristics did not have any clear bearing[91] on children's views of their parents' interest in their schoolwork. The few students who said their parents took an interest in what they did at school if they had time or energy, or who did not know if their parents were interested, were all from middle or high income families.

However, in terms of parental qualifications, children of parents with no qualifications were more likely to say their parents were not interested, they did not know if their parents were interested, or their parents were interested if they had time or energy (14 percent, compared with 4 percent of others).

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[91] In terms of socio-economic decile, children attending decile 1–2 and decile 7–8 schools had similar patterns, showing somewhat less parental interest than children attending other decile schools. But this was not a linear relationship.

It may be hard to work out which came first, but parental interest in school is closely linked to whether children talk to their parents about what happens to them at school. Almost every child who talked often to their parents about school felt their parents were interested in what they were doing at school, compared with 70 percent of those who sometimes talked to their parents, and 47 percent of those who did not talk to their parents about their school experiences. Children who talked to their parents about school were also more likely to feel that home was a place where *my family asks me about school* (64 percent, compared with 31 and 26 percent respectively), and that *my family makes sure I do my homework* (82 percent, compared with 73 and 68 percent).

Children who felt their parents took an interest in their school life were also more likely to feel that *home is a place I get listened to*: 46 percent rated this as 'always', compared with 16 percent of those who said their parents were sometimes interested in what they did at school, and 23 percent of those who felt their parents were not interested, or only if they had time. Parents who asked questions about school were more likely to be seen as interested than those who did not (55 percent of those who felt their parents took an interest gave an 'always' rating to *my family asks me about school,* compared with 30 percent of those whose family showed interest only sometimes, and 15 percent of those who felt their family was not interested, or only if they had time.

Children who talked to their parents about school often were more likely to talk about 'everything' than those who sometimes talked to their parents; but otherwise, both groups were just as likely to talk about school work or social problems such as bullying.

Future Education

Parental Expectations

At age 5, 29 percent of the children's parents wanted them to have a tertiary education. At age 6, this increased to 45 percent; and at age 8, there was a further increase to 54 percent. At age 10, 53 percent wanted their child to have a tertiary education, perhaps indicating that parents' goals for their children's education have stabilised by the time they are aged 8. It will be interesting to see if there is any change in this proportion when the children are 12, and secondary school is their next educational step.

Forty-eight percent[92]of the parents wanted their child to go *as far as they could*, and another 3 percent wanted *the best of everything*. Only 4 percent settled for the end of secondary school, and 1 percent for School Certificate.

Just over a third of the parents (34 percent) did not think anything would stand in the way of their child getting the education they would like them to have. The main obstacles that might stop children from realising the educational goals set by their parents were lack of money (30 percent, somewhat lower than the 38 percent at age 8), and the child's own choice (30 percent). Ten percent mentioned their child's attitude or temperament, 4 percent mentioned health and related problems, and 3 percent the child's own ability. Other reasons given by 1–2 percent each of the parents were changes of government policy, family problems, peer pressure, the possibility of pregnancy, unresponsive teachers or curriculum, and the unavailability of a suitable school or course.

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[92] Some parents gave more than one goal. Where this happened, the usual combination was tertiary education with 'as far as they want to go'.

There were no gender differences in relation to education aspirations. However, parents of boys were more likely to mention the child's attitude or temperament as a potential obstacle (14 percent, compared with 6 percent of girls).

Forty percent of the families were saving for their child's education after primary school. Six percent of families had someone other than the parents putting money aside for the child's future education. These proportions are much the same as they were when the study children were aged 8.

There were some clear differences in competency levels between the children whose parents wanted them to have a university or tertiary education, and those who did not specify this. One would expect such a difference, if aspirations for further education are based on informed parental understandings of their child's performance. So it is not clear whether aspirations at age 10 affect children's competency development so much as reflect it. For that reason, we looked back to the further educational aspirations that parents had for their children when the children were near age 5. The fact that there were fewer differences between children at age 10 which were related to parental aspirations at age 5 suggests that parents do use their child's school experience and progress over the first 5 years to come to some conclusions about their likely future educational career. However, it is also interesting that where the differences exist, they are found in some of the core work of school: Mathematics, reading (for comprehension), and Logical Problem-Solving.

Table 132

Parent Aspirations for child at Age 5 and Children's Competencies at Age 10

Aspirations at age 5→ Age 10 Competency↓	university or other tertiary *mean* n=83	any other response *mean* n=191	Prob. of F-value from anova	Percent variance acct. for
Mathematics	67.4	60.9	0.027	1.8
Literacy —PAT Reading Comprehension	53.3	47.0^^^^	0.031	1.7
Logical Problem-Solving*	64.6	60.1	0.019	2.0
Composite Competency*	70.4	67.9^^^^^^	0.048	1.5
Composite Cognitive Competency*	65.9	62.3^^^^^^	0.043	1.5

* In these cases the squared model was a better fit. ^ one fewer in this mean, ^^ two fewer in this mean, ^^^ three fewer in this mean, etc. The highest scores for each competency are in **bold type**.

However, including family income and maternal qualification in the model meant that the associations with aspirations for higher education were no longer significant, indicating that differences in parental aspirations were largely a reflection of social differences among parents. Forty-seven percent of the group who sought a university or tertiary education for their child at age 5 themselves had such qualifications, compared with 30 percent of the group with vague aspirations.

Obstacles to Children's Future Educational Achievement

We asked each child's teacher what they thought the main obstacles were for that child achieving their full potential in education. Where parents focused on resources and choice, teacher views of children's future education prospects—at secondary level as well as post-secondary—were more concerned with motivation, confidence, self-management, and social skills, than academic skills. Nothing was seen to stand in the way for a third of the children. This was more true for girls than boys: 40 percent, compared with 25 percent. Some family characteristics were reflected in these views. Whereas 42 percent of the children from high income homes faced no obstacle, only 17 percent of the children from low income homes, and 28 percent of those from middle income homes were thought to have no barriers in their way. Only 19 percent of the children whose mothers had no qualification were thought to face no obstacles, increasing to 46 percent of those with university-educated mothers. Family resources were mentioned as a barrier more for children from low income homes, or whose mothers had no qualifications.

However, ethnicity and school decile were not reflected in teachers' views of the children's educational futures.

Table 133

Teachers' Perceptions of the Main Obstacle to Children's Educational Achievement

Weakness	Age 10 (N=507) %
None	32
Poor self-management skills	28
Low self-esteem/confidence	25
Poor social skills	10
More interested in other things	8
Lack of academic skills	7
More interested in being popular	6
Family resources	4
Lack of family support	3
Poor health	3

Boys were more likely to face these obstacles to achieving their full educational potential: poor self management skills (37 percent, compared with 18 percent of girls); a greater interest in things other than education (15 percent, compared with one girl); and poor social skills (13 percent, compared with 6 percent of girls).

Choice of Secondary School

At age 5, 37 percent of the parents had decided which secondary school their child would enrol in, and at age 6, 39 percent. By age 8, 46 percent had made a choice, and 16 percent were considering two or more schools. Now at age 10, 55 percent of the parents had come to a decision, and 21 percent were deciding between two or more schools. Only 23 percent of parents remained undecided about choosing a secondary school for their child. Choice of secondary school was more likely to have been made for boys than for girls (60 percent, compared with 48 percent).

Twenty-four percent of parents gave one reason for their choice of secondary school, 24 percent two reasons, 14 percent, three reasons, and 13 percent, between four and seven reasons. However, there are some changes in the reasons for the choice between ages 5 and 10 (and perhaps an indication that parents might change their minds about particular schools in the years in between). School reputation remains dominant. Proximity to home is much less important, as children grow more independent. Curriculum activities, facilities, and school type become more important as the transition to secondary school looms closer, as do the decisions of the child's friends.

Table 134

Factors in Parental Choice of Secondary School

	Percentage of those already decided			
Reason	When child Aged 5 (n=115) %	When child aged 6 (n=115) %	When child aged 8 (n=240) %	When child aged 10 (n=278) %
Reputation	63	68	64	52
School type	32	36	41	43
Curriculum/activities	14	15	25	35
Previous family attendance/personal	41	43	44	31
Proximity to home	48	61	58	27
School facilities	10	10	5	21
Peer group/friends	0	12	12	17
Discipline/school climate	11	14	15	9
School/class size	9	9	11	9
School mix	–	–	6	5
Cost	5	6	5	3
By default/no choice	–	2	2	2

Table 135 shows the characteristics of the actual secondary schools named by parents as their desired school, or a school under consideration. Preferences for high decile schools remain marked. This is consistent with other research on parental preferences for schools (e.g. Lauder & Hughes et al, 1999). It will be interesting to track how many of these preferences can actually be met when the children make their transition to secondary school, and whether the changes to enrolment policy which came in for the 2001 school year provide more equal access to preferred schools for students from low income homes than Lauder & Hughes et al found in 1995.

Table 135

Characteristics of Secondary Schools Already Chosen by Children's Parents

School characteristics ↓	Parental choice age 10 (n= 278) %	Parental choice age 8 (n=240) %	Wellington Region secondary schools (n=39) %	National secondary schools (n=336) %
Affiliation				
State	64	63	62	75
Integrated	27	26	33	21
Private	9	11	5	4
School Decile				
Decile 1–2	6	7	11	14
Decile 3–4	8	3	21	23
Decile 5–6	9	13	13	25
Decile 7–8	17	10	21	20
Decile 9–10	59	66	34	18
Roll Size				
<200	2	1	8	8
200–299	4	3	10	8
300–499	10	11	21	22
500–750	28	31	21	22
750+	57	53	41	40
Proportion of Maori Enrolment				
<8% Maori on roll	53	43	34	33
8–14% Maori on roll	23	37	24	21
15–29% Maori on roll	19	17	29	25
30%+ Maori on roll	6	3	13	21

But preferences—or views of what was realistic—also differed in terms of family characteristics, as Table 136 shows.

Table 136

Family Characteristics and Parental Preferences for Their Child's Secondary School

School Decile Chosen	1–2	3–4	5–6	7–8	9–10
Income %					
High	2	4	7	15	72
Medium	8	11	14	22	44
Low	12	11	9	14	54
Maternal qualification %					
None	17	11	9	21	43
School	6	8	9	16	61
Tertiary	8	10	17	15	50
University	0	1	6	21	72
Ethnicity %					
Pakeha	3	8	10	17	62
Maori	16	11	13	13	47
Pacific*	24	19	10	14	33
Asian*	10	0	0	20	70

School Ownership Chosen	State	State-integrated	Private
Income %			
High	55	30	15
Medium	70	27	2
Low	76	18	7
Maternal qualification %			
None	51	44	4
School	66	25	9
Tertiary	62	25	3
University	70	16	14
Ethnicity %			
Pakeha	66	24	11
Maori	68	32	0
Pacific*	57	43	0
Asian*	50	40	10

* N.B. The size of these groups is small (Pacific=21, Asian=10), and the data should be viewed with caution.

Summary

There are three key participants in children's transition to school and their subsequent progress: the child, their parents, and their teachers. The common thread running through the material presented in this chapter is the importance of good communication between all three. Adults need to take the lead here, not just to check how children are feeling or what they are experiencing, but also to get children used to talking about their school days and work as an everyday occurrence, something 'natural' in their interaction with their parents and teachers. Our data indicate that this conversational flow occurs less for children whose parents did not enjoy educational success themselves. They value education, but it may not have the same specific meaning that it has for others. It is certainly harder for these parents to see tertiary education in their child's future.

Children's feelings at the start of school—or the evident absence of them—are clear and useful indicators of the need for adult support, and intervention. Unhappiness draws attention readily enough: yet reluctant and matter of fact responses also warrant action.

Parents, especially mothers, and teachers still have a great deal of contact with one another at age 10, but this is gradually declining as children grow more independent, and mothers are more likely to be in paid employment, or to be working longer hours. It is interesting that parental satisfaction levels are less closely tied to teachers' overall assessments of children's progress than they have been previously, and that dissatisfied parents are more likely now to include those whose children are identified as high achievers by their teachers.

Parents and teachers of the children at age 10 are less likely to work together on children's problems related to their happiness or social well-being. Boys continue to receive more of this joint attention than did girls, though parental satisfaction levels with boys' achievement are now much the same as for girls.

Many parents feel they have now decided on their child's secondary school. Family characteristics play a role in this choice. Resources and student choice loom large for parents when they think of their child's long term educational achievement, whereas individual motivation and skills occupy teachers' minds. Family income and maternal qualification are reflected in teachers' long term views of children's educational performance, in contrast to their current views; ethnicity is not, however. Teachers do see boys facing more obstacles in education than girls, in both the short and the long term.

13 TEACHERS' PERSPECTIVES ON THE CHILDREN'S PROGRESS

In this chapter we look at teachers' assessments of the study children's overall achievement levels and estimates of their reading age, their views of the children's curriculum strengths and weaknesses, and their behaviour around the school.

Children's Overall Progress

Teachers' global assessments of children's overall level of achievement show clear linear associations with their competency levels at age 10, as we measured these, whether through tasks done by the children, or through teacher ratings. The exception is Curiosity, with only the highest level standing out.

Table 137

Overall Achievement Level and Competencies at Age 10

Overall Achievement Level→ Age 10 Competency↓	low *mean* n=9	slow *mean* n=56	average *mean* n=139	average but v.good in some areas *mean* n=148	v.good/ excellent *mean* n=155	Prob. of F-value from anova	Percent variance acct. for
Curiosity	58.3	53.3	58.9	65.3	**71.6**	3×10^{-13}	12.0
Perseverance	30.8	53.3	61.4	71.9	**84.5**	0	37.4
Individual Responsibility	34.4	54.5	61.5	68.5	**80.9**	0	28.5
Social Skills with Peers*	39.5	62.2	66.7	68.9	**74.5**	0	19.0
Social Skills with Adults*	47.7	64.1	71.1	76.7	**82.8**	0	16.3
Communication*	32.9	54.4	63.7	73.2	**83.3**	0	43.8
Mathematics	27.8	40.3	53.5	67.0	**78.0**	0	34.2
Literacy —PAT Reading Comprehension	15.8^^	25.9^^^	40.0^	50.0	**65.5**	0	38.8
Literacy—Burt Word Reading	34.8	45.6	57.2	67.6	**77.0**	0	40.0
Literacy —writing*	41.1^	61.9	67.5	73.6	**76.7**	0	21.8
Literacy —reading age	7yr6mth	9yr1mth	10yr6mth	11yr8mth	**12yr9mth**	0	49.0
Logical Problem-Solving*	38.3	48.2	56.3	63.6	**69.6**	0	29.8
Composite Competency*	39.2^^^	55.4^^^	63.2^	70.3	**78.4**	0	57.2
Composite Cognitive Competency*	36.9^^^	47.2^^^	56.5^	65.7	**73.9**	0	47.1
Composite Social & Attitudinal Competency*	40.6	57.0	63.9	70.8	**79.6**	0	38.8

* In these cases the squared model was a better fit. ^ one fewer in this mean, ^^ two fewer in this mean, ^^^ three fewer in this mean, etc. The highest scores for each competency are in **bold** type.

Cross-year Changes in Teacher Estimates of Children's Overall Progress

Teachers' summary views of children's overall achievement do reflect their ratings of the children, as one might expect. If nothing else, this indicates that the competencies we have included in the Competent Children project are ones which teachers think relevant to achievement.

Teachers' summary views are also consistent with our tasks: again not surprising, since these tasks include some which are commonly used in New Zealand primary schools. But this consistency also indicates that teachers do draw on information from individual assessments to make overall assessments.

We found similar consistencies between teachers' summary ratings and the children's competency levels in our analysis at ages 6 and 8. One interesting thing which emerges in our material, however, is that while the summary views of teachers are valid at any one time in terms of comparing children with one another, individual children's overall status in terms of achievement can change from teacher to teacher, and from class to class. The next two tables compare how children were seen at age 10 with how they were seen at age 6 and at age 8.

Table 138

Teacher Assessments of Children at Ages 6 and 10

Age 10 → Age 6↓	Slow/ minimal (n=40) %	Average/ medium (n= 78) %	Average/ very good (n= 80) %	Very good/ excellent (n= 100) %
Minimal/slow	25	15	16	20
Average/medium	50	26	26	31
Average/very good	23	21	24	21
Very good/excellent	27	38	34	28

Table 139

Teacher Assessments of Children at Ages 8 and 10

Age 10 → Age 8 ↓	Slow/ minimal (n=65) %	Average/ medium (n=139) %	Average/ very good (n=148) %	Very good/ excellent (n=155) %
Minimal/slow	12	16	16	16
Average/medium	29	27	31	29
Average/very good	37	35	28	32
Very good/excellent	22	22	24	24

Unlike the cognitive competency measures, teachers' judgements were unrelated to family income. They were also unrelated to ethnicity. They were, however, related to maternal qualification levels. Only 9 percent of the children whose mothers had no qualification were regarded as having a very good/excellent level of achievement, compared with 28 percent of children whose mothers had a mid-senior school qualification, and 42 percent of those with tertiary or university qualifications.

The distribution is not 'normal' in statistical terms: it has no peak at the average level. Teachers showed a desire to recognise that individual children could perform better in some aspects of school work than others.

This overall assessment of academic achievement showed some linkages with children's classroom behaviour: the higher the level of achievement, the higher the proportion of children seen to be mature, sensible, and providing leadership. Conversely, the lower the level of achievement, the higher the proportion of children seen to have poor self-esteem, to be immature or easily led astray, be impatient, and live in their own world. Few of the very good/excellent achievers were seen to have poor work habits. But they could be as passive, self-centred, or bossy as other children.

Not surprisingly, barriers to children's achieving their full educational potential were lowest for the very good/excellent achievers: 59 percent were thought to face no particular obstacle, compared with 30 percent of the very good/average achievers, 17 percent of the average achievers, and 5 percent of the below-average achievers. Poor self-management, a lack of both academic and social skills, and low self-esteem were the main obstacles for the minimal achievers. Those achieving below average faced the same set of difficulties, minus poor social skills.

A third of the children whose overall achievement was seen as minimal or below average by their teacher had bullied another child, declining to 13 percent of those with very good or excellent achievement levels. Children achieving at a very good/excellent level were least likely to be bullied: 13 percent, compared with 22 percent for other children.

Children whose achievement was seen as minimal were more likely to have poor or only satisfactory attendance than other children.

Teachers' views of children's overall achievement were related to their sense of the child's home support for learning. Seventy-eight percent of the minimally achieving children had a rating of 1–3 on our 5 point scale (5 = 'fantastic') of home support for children's learning, compared with 36 percent of the below average achievers, 34 percent of the average achievers, 17 percent of the very good/average achievers, and 10 percent of the very good/excellent achievers.

Reading Progress

We asked teachers for the range of reading ages in their class. The average lowest reading age was 7½ years, and the highest, 14 years. As reported in Chapter 11, these average reading ages largely reflected school decile rankings, with decile 9-10 schools having the highest averages for lowest and highest reading ages.

We also asked teachers to estimate each child's reading age. Teachers reported the study children as having an average reading age of between 11 years 6 months and 11 years 11 months. At age 8, 5 percent of the study children were estimated to be reading at the equivalent of 13 years; at age 10, 25 percent were reading at this level, 3 years above their chronological age.

Table 140

Teacher Estimations of Children's Reading Ages at Age 8 and Age 10

Reading Age	Age 8 (N=521) %	Age 10 (N=505) %
Below 7 years	3	1
7.0–7.5 months	5	1
7.6–7.11 months	8	1
8.0–8.5 months	11	2
8.6–8.11 months	11	4
9.0–9.5 months	13	5
9.6–9.11 months	11	6
10.0–10.5 months	8	9
10.6–10.11 months	8	13
11.0–11.5 months	6	8
11.6–11.11 months	4	7
12.0–12.5 months	3	9
12.6–12.11 months	3	9
13 years and over	5	(25)
13.0–13.5 months		6
13.6–13.11 months		6
14.0–14.5 months		7
14.6–14.11 months		3
15 years and over		3

In looking at teacher estimates of reading age between 8 and 10 years, we found little consistency. A child who was estimated to be reading below their chronological age at age 10 was just as likely to have been reading well above their chronological age at age 8 as below it—and the converse was true for those who were seen to have a reading age of 12 or more at age 10. This suggests that 'reading age' is not a clear, fixed scale in teachers' minds, probably because assessment tools have become more curriculum linked. However, like teachers' perceptions of children's overall achievement, their estimate of reading age does appear valid at the time, at least in the way that it relates to many of the factors we analysed.

Children's Curriculum Strengths and Difficulties

The next table gives teachers' perceptions of the study children's curriculum strengths and weaknesses at age 10, compared with those reported at ages 6 and 8. These two perceptions combined do not add up to 100 percent, indicating that a sizeable proportion of children are seen as coping with a curriculum area, rather than either shining or struggling.

Sizeable proportions of children were still having difficulty in reading, Mathematics, story writing, spelling, and handwriting. There was little change between ages 8 and 10, which is consistent with the conclusion from our analysis of our competency measures (Chapter 3) that the first three years of school provide the vital platform for patterns of future learning.

Problem-Solving and information technology were identified as areas of strength for the first time in children's school lives. Only two curriculum areas show steady increases between ages 6 and 10: physical education and science. Between age 8 and age 10, reading, social studies, and technology show increases in the proportion of children identified as showing strength in them. There was little change for the other curriculum areas, including Mathematics and oral language.

Table 141

Children's Areas of Strength and Difficulty in the Curriculum: Ages 6, 8 and 10

	Strength %			Difficulty %		
Curriculum Area	Age 6 (N=297)	Age 8 (N=523)	Age 10 (N=507)	Age 6 (N=297)	Age 8 (N=523)	Age 10 (N=507)
Reading	43	44	56	28	17	15
Mathematics	48	44	46	9	24	22
Physical education	26	32	44	8	8	8
Story writing	35	40	35	26	24	19
Oral language	26	31	35	14	9	7
Art or music	32	33	29	5	4	5
Science	19	23	26	2	2	5
Other writing–letters/reports	0	18	24	0	12	13
Spelling	12	22	24	14	24	27
Handwriting	20	17	23	15	19	21
Social studies	11	16	22	2	3	3
Technology	0	15	22	0	1	4
Problem-Solving/lateral thinking	0	0	21	0	0	10
Drama	0	12	16	0	2	3
Information technology	0	0	14	0	0	4
Health	0	5	7	0	1	2
Te Reo	0	4	5	0	1	3
Religious studies	0	2	3	0	1	0
Nothing	5	3	3	45	36	38

Teacher perspectives were unrelated to family income levels. However, there were some differences distinguishing decile 1–2 children from others, either suggesting different curriculum emphases, perhaps, or that teachers were taking some account of family background, or their perception of it.

Decile 1–2 students were more likely to be seen as having strengths in physical education (65 percent, compared with 42 percent of children in decile 3–10 schools), and in music or art (48 percent, compared with 27 percent of children in decile 3–10 schools). Children in decile 1–4 schools were almost three times as likely as those in decile 5–10 schools to be seen as having strengths in te reo Maori (11 percent, compared with 3 percent).

Decile 1–2 children were seen to have more difficulty with Mathematics (39 percent, compared with 20 percent of children in decile 3–10 schools), with problem-solving or lateral thinking (28 percent, compared with 9 percent), music or art (17 percent, compared with 3 percent), science (13 percent, compared with 4 percent), te reo Maori (11 percent, compared with 3 percent), and information technology (11 percent, compared with 3 percent). Only 17 percent of the decile 1–2 children in the study were seen to have no difficulty with curriculum-related school work, compared with 42 percent of children in decile 3–10 schools.

Gender and Teachers' Perceptions of Children's Strengths

The next table compares teachers' assessments of boys' and girls' curriculum strengths. Gender does seem to play a part in teachers' perspectives: there are few curriculum areas where there are no differences seen between girls and boys. Girls are seen to be stronger in language, social studies, health, music or art, and drama. Boys are seen to be stronger in Mathematics, physical education, science, problem-solving, technology, and information technology.

Table 142

Children's Areas of Curriculum Strength: Boys and Girls

	Girls			Boys		
Curriculum Area	Age 6 (n=135) %	Age 8 (n=248) %	Age 10 (n=239) %	Age 6 (n=163) %	Age 8 (n=275) %	Age 10 (n=268) %
Reading	57	63	66	32	47	46
Story writing	49	54	49	23	26	22
Oral language	30	36	38	23	27	32
Maths	36	30	38	58	56	53
Other writing	0	25	34	0	12	16
Music/art	39	40	33	25	27	26
Spelling	20	30	31	6	14	19
Handwriting	28	20	30	13	14	17
Physical education	22	21	26	29	43	60
Social studies	13	18	25	10	15	20
Drama	0	13	19	0	11	13
Science	13	13	16	10	33	35
Problem-Solving/lateral thinking	0	0	16	0	0	27
Technology	0	9	12	0	22	31
Health	0	8	11	0	3	4
Information technology	0	0	7	0	0	21
Te Reo	0	4	7	0	4	4
None	0	3	4	0	2	2
Religious studies	0	2	3	0	1	2

Curriculum Areas and General Progress

The next table shows strengths in relation to overall school progress at age 10. All the children described as achieving below average were seen as having areas of difficulty with the curriculum, compared with 66 percent of the children described as achieving at a very good/excellent level. Their areas of difficulty were in all the curriculum areas: except for music, art, drama, and physical education, which were the main strengths described for this group.

Children in the highest achievement level were more likely than others to have strengths identified in transactional writing (for information rather than story writing), spelling, handwriting, science, social studies, and problem-solving.

Table 143

Children's Areas of Strength in Relation to their Overall School Progress

Overall progress → Curriculum Area ↓ Strength	Minimal/ very slow (n=9) %	Slow/below average (n=56) %	Average/ medium (n=139) %	Average but very good in some areas (n=148) %	Very good/ excellent (n=155) %
Overall progress	*2*	*11*	*27*	*29*	*31*
Reading	0	11	38	62	85
Maths	33	18	24	47	75
Story writing	0	4	21	37	58
Spelling	0	4	8	24	49
Oral language	22	20	32	39	39
Other writing	0	4	9	24	47
Music/art	44	38	27	28	29
Science	0	11	21	26	38
Social studies	0	7	17	22	35
Physical education	56	55	50	44	35
Handwriting	22	20	17	19	34
Technology	22	11	18	18	32
Drama	22	16	15	16	16
Health	0	4	3	8	12
Te Reo	0	9	6	4	5
Religious studies	0	4	4	0	4
Problem-Solving and lateral thinking	0	0	9	26	37
Information technology	0	7	12	16	19
None	11	5	7	1	0

Children's Behaviour

Teachers' descriptions of children's behaviour at school at age 10 were much the same as they had been at age 8. Again, this is consistent with the pattern we have seen for the first three years to lay the ground for subsequent school performance. Maturity, a sense of humour, and creative or inventive behaviour are mentioned less at age 6 than at later ages. Reliability, willingness, and trying hard are mentioned less at the later ages.

Table 144

Teachers' Views of Children's Non-curriculum Strengths: Ages 6,8 and 10

Strength	Age 6 (N=298) %	Age 8 (N=523) %	Age 10 (N=507) %
Well behaved/courteous/polite	–	45	42
Kind/warm-hearted	55	42	42
Mature	26	40	40
Outgoing	31	30	30
Reliable	43	29	33
Willing	46	20	23
Tries hard	43	19	16
Organised	19	19	24
Sense of humour	–	12	15
Leader	14	10	14
Creative/inventive	–	8	6
None	3	2	2

As the next table shows, teachers remained less inclined to describe weaknesses than strengths in the children's behaviour, manner, or approach to life. However, there has been a steady erosion of the proportion of children described as having no weaknesses at all, to 19 percent.

As at age 8, the main drawbacks seen in the study children were poor work habits, being shy, too dependent, or lacking in self-esteem, maturity or self control – reversals of teachers' views of desirable behaviour. But fewer children were described as aggressive, or unwilling to try things.

Table 145

Teachers' Views of Children's Non-curriculum Weaknesses: Ages 6, 8, and 10

Weakness	Age 6 (N=298) %	Age 8 (N=523) %	Age 10 (N=507) %
Poor work habits	–	26	30
Passive (shy, too dependent)	26	22	23
Poor self-concept/low self-esteem/insecure	18	18	16
Self-centred/willful	16	14	15
Immature	–	14	13
Aggressive	9	11	5
Will not try	7	7	4
Lives in own world	5	5	3
Impatient	13	4	1
Bossy	–	3	4
Unreliable	7	2	2
Spoilt	1	–	
Lacks friends	7	–	–
None	28	24	19

There were some interesting relations between children's perceived strengths and weaknesses. Few of those described as leaders, as outgoing/popular, or as having a sense of humour were seen as passive, or with low self-esteem. But leaders, like those seen as creative or inventive, were most likely to be seen as self-centred or wilful. Those most likely to be seen as having poor work habits were the creative and inventive, the popular, and those whose strength lay in trying hard. Otherwise, particular strengths did not necessarily indicate particular weaknesses, and vice versa.

Summary

Teachers' assessments of their students' overall achievement at age 10 appear to draw both on the kinds of standardised assessments we have used for most of our cognitive competency measures, and on assessment of the kinds of attitudes and behaviours which we have used for our social and attitudinal competencies. They do not appear to use social characteristics of children, such as ethnicity, family type, or family income in the formation of this overall perspective, but their views of children's classroom behaviour are related to it.

The fact that an individual child can be placed in one category in terms of overall achievement at age 8, and in another at age 10, suggests that overall achievement categories are conditional upon individual teachers, their interaction with a particular child, and perhaps the classroom and school culture and organisation.

Teachers continued to look for strengths, even in children whose overall performance they thought low or slow. Again, social characteristics do not appear to be involved, with the marked exception of gender.

The comparatively static proportions of children who are seen to have strengths in Mathematics, story writing, and art or music from ages 6 to 10 raises questions. Is it because these aspects of the curriculum are seen as more dependent on prior learning or talent than, say, reading? This is certainly consistent with our analysis of performance patterns over time for Mathematics (Chapter 3).

The overall picture indicates that most of the children's weaknesses and strengths, both curriculum and non-curriculum (though the non-curriculum aspects are important aspects of children's ability to access learning), appear to be evident by age 8—though individual children are seen differently by different teachers. This pattern reinforces the value of seeing the first three years of school as the critical base for future learning. It does not mean that children who do not start well cannot change habits and gain core knowledge in time to develop more sophisticated understandings; simply that it is much harder for them to do so, and harder work too for the teachers and parents who support them.

14 WHICH ASPECTS OF CHILDREN'S LIVES MATTER MOST?

Our focus in the preceding nine chapters has been on resources, experiences, and characteristics, the role they play in children's lives, and their association with children's competency levels at age 10. In this chapter, we return the focus to the competencies, and bring together the information from the preceding chapters about the factors which seem to have a bearing on children's competency levels, to compare the weight of each of these factors, and thus to gain a better understanding of which ones merit greater attention in endeavours to improve children's achievements and capabilities. As discussed in Chapter 4, we believe that such understanding comes from taking different approaches to the data: an analysis of each factor's contribution in relation to others; and analyses using some 'omnibus' models which aim to provide the most parsimonious statistical 'explanation' of the variance or spread of children's scores, and therefore provide a much reduced set of factors which appear to be key. Both analyses provide us with different insights. Together they provide a much richer understanding of children's progress than we could obtain from relying on only one method of analysis.

We start with summary tables for the key competency measures (see Chapter 2) of Mathematics, PAT Reading Comprehension, Perseverance, Communication, and Individual Responsibility. These tables list the main factors associated with each particular competency, in descending order according to the percentage point difference the factor makes in children's scores.[93] They also describe the particular levels or aspects of each factor in terms of children's performance levels on the competency measure (as low, middling, and high), and so build up a picture of the kind of environment in which children are likely to do better, or worse. While we have included a wide range of factors, we have not been able to include every factor which is likely to have a bearing on children's competency levels. Some of the factors we include here are likely to be 'standing for' or proxy for other factors, which we did not include, or which are difficult to measure.[94]

The tables also give the percentage of the variance of children's scores, accounted for by the factor in one-factor modelling. Since each analysis stands alone, these percentages of variance are not additive: clearly, many of the factors and levels within the factors will occur together, and in a statistical sense can be seen as 'confounding' factors. This does not make their association with children's competencies spurious. Most, but not all, of the factors in these summary tables have an association over and above family income or maternal qualification.[95]

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[93] Our cut-off point for inclusion in these summary tables was that different levels or aspects of a factor showed a percentage point difference of 6 or more for Mathematics and the PAT Reading Comprehension test scores, and 5 or more for Perseverance, Communication, and Individual Responsibility.
Standard errors (s.e.) of percentage point differences are also given in the summary tables to gauge the strength of the statistical association. Large standard errors for our sample are usually the result of small sub-group size, rather than particularly large fluctuations in the results. While large standard errors do not invalidate the difference found, they do point to the need to be cautious about generalising the difference to all children.

[94] It is also possible that some of the associations found may be spurious. We have generally ignored associations where there were internal inconsistencies, but this is harder to tell when a factor has only two levels.

We order the summary tables in descending order of the largest percentage point difference between sub-groups of a given factor. We choose the size of the difference with which the factor is associated to order the tables, rather than the percentage of variance it explains, because it is the size of this difference that is of more concern in terms of practical outcomes. The percentage of variance accounted for in a model will generally increase with the number of levels in a given factor, so comparisons of the percentage of variance accounted for are less direct when different factors are involved.

But both the percentage point difference and the percentage of variance give us different and complementary information about the relationships between factors and the children's competencies.

For Mathematics, the PAT Reading Comprehension test, Communication, Perseverance, and Individual Responsibility, we also provide the results of multifactor modelling which produces a set of key factors in terms of children's interests, experiences and behaviours. This modelling initially omitted family income, educational structural characteristics, and family occupational factors, since these are factors which are less amenable to individual change. The models show the kinds of activities which can make a difference for children, irrespective of family factors.

We then provide models of children's performance at age 10 which incorporate their previous performance at ages 5, 6, and 8, together with the factors analysed in this report which had the largest associations with competencies at age 10.[96] This enables us to see the likely key contributors to children's overall competency levels, and changes over time in these key contributors, between the earlier performances and age 10 performance. As with the modelling of particular competencies, some of these key factors underpin others, particularly if the factors are closely linked, while others are there substantially in their own right. This modelling is particularly useful in getting further insight into why maternal qualification and family income levels affect children.

It is important to realise that while these factors can be identified as key in a statistical sense, they are not the only factors at work, nor the only important ones. While some of the one-factor models account for a reasonable percentage of the variance in children's scores, none of them can account for all of it. Children's performance and capabilities are the result of compound experiences, with many different dimensions and cross-overs between different aspects of their lives. There is no single recipe which will guarantee that every child will be competent in all aspects of their life. There do appear to be some underlying principles or threads which can run through quite different experiences and interests to provide children with solid knowledge and confidence, yet also challenge them to keep going further.

In the overviews and interpretations which follow, we therefore concentrate on patterns which are evident for the factors which fit our (somewhat arbitrary) groups of 'very large impact' (18 or more percentage points difference between the highest and lowest performing sub-groups of each factor), and 'large impact' (13 <18 percentage points difference).

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[95] We found a ready reckoner for whether a factor did make a contribution independent of its co-occurrence with these two major or 'umbrella' factors was whether it accounted for more than around 2 percent of the variance in children's scores. Some factors, e.g. welfare receipt, did account for more than this; yet they 'disappeared' when family income or maternal qualification were added.

[96] These models use only the 'original' sample of children for whom we had data on their final early childhood education centre.

Mathematics

Mathematics performance reflects many of the factors we analysed: 110 factors showed differences of between 29 and 6 percentage points in children's scores, leaving aside children's overall achievement level as gauged by their teachers.

If we look at the 26 factors in Table 146 which we have grouped as those having a 'very large impact', with at least 18 percentage point differences between the highest and lowest performing sub-groups of a given factor,[97] we see that family socio-economic status is well represented, mainly through parental education and occupational status, current and previous, and through persistence of income levels, signalled through the factor of income change. Only one school and two early childhood education characteristics feature, all related to the socio-economic status of the children served. Our analysis of early childhood education centre student socio-economic mix showed that the middle class centres were also those which offered the better quality learning opportunities. Unfortunately, we do not have comparable data about schools. Of particular interest at age 10 is that while the trend for children in decile 1-2 schools to score lower for Mathematics is consistent with earlier ages, the fact that children in decile 3-4 schools scored as well as those in decile 9-10 schools is new. This is consistent with there being a threshold for student socio-economic mix: it matters at the lowest extreme, but patterns above that can vary, and are not always linear.

Students who feel they always get a hard time at school score lower than others. This may signal a disengagement with school. It makes sense, too, that the item from the set of children's understanding about learning which makes the biggest difference for children's Mathematics scores is the one which relates good learning with the solution of problems, through working at them.

What happens at home matters for mathematics development. Of all the leisure activities which parents and children told us about, it is television watching which carries most weight. It appears to cut into the practice and development of other habits, such as the use of mathematics at home, reading (for instruction, which indicates other interests), homework itself, and the use of a public library, indicating a confidence in using reading to enlarge knowledge and understanding, as well as enjoyment.

What does not happen at home also matters: children who are disengaged at home, through boredom, loneliness, or feeling unfairly treated, or whose time is taken up with household work rather than learning work, tend to have lower scores.

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[97] This is a relatively arbitrary division – there were no clear thresholds or gaps.

Table 146

Mathematics Score: Factors Showing a Very Large Impact

Number of levels	Factor in order of association by size of largest observed significant sub-group difference ↓	Factor levels with generally low performance	Factor levels with middling performance	Factor levels with generally high performance	Largest observed difference	s.e of given diff.	% variance acctd. for
5 levels	Overall achievement level	one	four	five	50.2	6.3	34.2
6 levels	Mother's qualification	none	mid-school to tertiary	university	28.8	3.4	14.7
5 levels	School decile	1–2	5–8	3–4 / 9–10	26.0	3.2	12.0
6 levels	Parental TV watching when child 8	≥4 hours	<4 hours	none	26.0	6.6	5.9
6 levels	ECS type near age 5	Aoga A'mata		all others	25.0	8.1	2.6
4 levels	Child feels lonely at home	often or always	never	sometimes	24.9	7.6	3.6
9 levels	*Changes in family income	low – low, >30–50K	other movements	high to high	24.2	4.1	9.5
2 levels	Home maths - tells time correctly	no		yes	24.1	3.3	9.9
4 levels	Child gets treated fairly at home	never	sometimes	often/always	23.1	8.0	4.5
3 levels	Pat.occupation when child is 10	unskilled	skilled	professional	23.0	3.6	11.7
4 levels	Child helps out at home	never	always	often/sometimes	23.0	6.2	7.4
3 levels	Mat.occupation at birth of 1st child	unskilled	skilled	professional	22.5	4.7	9.5
3 levels	Pat.occupation at birth of 1st child	unskilled	skilled	professional	22.2	4.7	10.1
5 levels	Child daily TV watching age 10	≥2 hours	<2 hrs	none	21.9	6.3	6.0
2 levels	Home maths - adds money correctly	no		yes	21.2	3.9	5.6
4 levels	Child's ethnicity	Pacific Island	Maori	Pākehā/Asian	20.9	4.4	6.9
4 levels	At school, I get a hard time	always	often	sometimes/never	20.8	7.3	1.9
4 levels	Socio-economic mix of ECE	wide or low income	low-middle income	middle-class	20.2	4.3	13.9
2 levels	Home reading – instructions	no		yes	19.9	3.0	8.3
4 levels	Child gets bored at home	always	often/never	sometimes	19.6	4.2	6.9
2 levels	Home maths – can work out halves & quarters	no		yes	19.5	2.9	8.1
5 levels	Child daily TV watching age 8	≥2 hours	<2 hrs	none	18.9	6.0	3.9
3 levels	Homework	no	Varies	yes	18.8	4.0	5.5
5 levels	Frequency of getting books from Public library	irregular/ don't know	1,2,4 wkly	3 weekly	18.7	3.6	7.0
2 levels	Home maths - uses a ruler to Measure accurately	no		yes	18.5	2.6	9.0
3 levels	Feeling doing well at school through solving a problem by working hard	disagree	not sure	agree	18.3	5.2	2.4
6 levels	Parental TV watching when child 10	≥3 hours	1 – (3) hours	up to 1 hour	18.2	6.3	4.0

These patterns continue in the main through the groupings of the factors showing 'large' impacts (31 factors) and moderate impacts (53 factors) with children's Mathematics scores. School-related factors and early childhood education quality factors are found in the factors having a large impact (13 <18 percentage points). Some out of school activities show: fine arts and performing arts lessons. The factors showing moderate impacts (6 <13) are largely related to children's reports of their school and home experience, and their other out of school interests. The 'large' factors are described below, and the 'moderate' factors in Appendix 5.

Table 147

Mathematics Score: Factors Showing a Large Impact

Number of levels	Factor in order of association by size of largest observed significant sub-group difference ↓	Factor levels with generally low performance	Factor levels with Middling performance	Factor levels with generally high performance	largest observed difference	s.e of given diff.	% variance acctd. for
4 levels	Family income at age 5	≤$30K	>$30K-$70K	>$70K	17.7	2.9	7.6
2 levels	English 2nd language age 5	yes		no	17.7	5.1	2.3
3 levels	Feeling doing well at school through getting a new idea of how things work	disagree	not sure	agree	17.6	4.7	2.9
2 levels	Home maths - does × tables up to 10	no		yes	17.5	2.3	10.1
3 levels	Child enjoys reading	no	qualified yes	yes	17.0	2.6	9.0
4 levels	Available income per person in household	up to $3800	in between	>$8900	16.7	3.1	6.4
2 levels	Fine arts lessons out of school	no extra lessons		fine arts lessons	16.7	5.7	3.2
4 levels	Child's initial response to school	matter-of-fact	while to settle/ enthusiasm	unhappy	16.6	8.2	3.7
2 levels	Home maths - can work out fractions & proportions aside of ½ and ¼	no		yes	16.5	1.9	13.1
4 levels	At school, teacher treats me fairly	never	always/sometimes	often	16.5	7.0	2.1
3 levels	Child's rating of their class for cohesiveness	high	medium	low	16.4	2.7	8.2
2 levels	Home reading – fiction	no		yes	16.4	3.3	4.7
5 levels	Child daily TV watching age 6	≥3 hours	1-(3) hours	up to 1 hour	16.4	7.3	5.4
2 levels	Child has friends home to play	never	always	often/sometimes	16.2	6.4	2.3
2 levels	Age 10 computer ownership	no		yes	15.8	2.4	7.9
4 levels	Family income at age 8	≤$50K	>$50K-$70K	>$70K	15.7	2.8	8.3
2 levels	Home maths - can use calculator for addition & subtraction	no		yes	15.7	3.9	3.1
5 levels	Child daily TV watching age 5	≥3 hours	<3 hours	none	15.7	6.8	5.1
4 levels	How child copes with upset	upsets, not coping		no upsets/upsets but copes/coping varies	14.7	5.6	1.5
2 levels	Home maths - does times tables over 10	no		yes	14.6	1.9	10.3
2 levels	Performing arts lessons out of school	no extra lessons		perf.arts lessons	14.3	2.2	9.3
5 levels	Teacher's view of family support for Schoolwork	little/none	some/good/ don't know	fantastic	14.0	3.8	4.7
4 levels	ECE staff joined chn in their play	<4th quartile		4th quartile	13.9	4.4	4.1
4 levels	At school, I could do better work if I tried	always	sometimes/often	never	13.9	4.4	4.3
4 levels	ECE print saturated	1st quartile	2nd&3rd quartile	4th quartile	13.8	4.5	4.5
3 levels	Maternal occupation when child 10	unskilled	skilled	professional	13.7	3.4	4.3
2 levels	Home maths - uses a scales to weigh accurately	no		yes	13.6	2.0	8.7
3 levels	Child gets help at home if help needed	sometimes	always	often	13.6	3.2	3.6
4 levels	ECE staff guide children in activities	<4th quartile		4th quartile	13.4	3.8	4.7
2 levels	Age 8 computer ownership	no		yes	13.3	2.2	7.0
4 levels	ECE staff responsive	1st quartile	2nd&3rd quartile	4th quartile	13.1	3.9	4.6
5 levels	Welfare history in last 5 years	other benefit any length of time	DPB any length of time	not on benefit at age 10	13.0	5.4	2.1

Multifactor Modelling of the Variance in Children's Mathematics Scores at Age 10

In the model below, which accounted for 48 percent of the variance between children's Mathematics scores at age 10, the importance of the way children spend their out-of-school time is underlined. Using mathematical knowledge in applied ways, and engaging with the wider world through reading—indirectly gaining an appreciation of patterns (e.g. through the structure of stories or sections of non-fiction books), and of the way investigation can uncover truths—are of particular benefit to children's mathematics performance at age 10.

Table 148

Effects of Factors in a Model for Mathematics Scores at Age 10

Factor (comparison in brackets, first level given is "the best")		p-value from ANOVA with this factor fitted last	size of largest contrast	s.e.	prob for this contrast
Reading of books from library	(3 weekly cf none)	0.004	16.3	4.2	0.0001
ECE socio-economic mix	(middle-class cf wide)	0.002	12.4	3.2	0.0001
Children allowed time to complete activities at ECE	(4th quartile cf 1st quartile)	0.019	10.9	3.6	0.003
Home maths – tables over 10	(yes cf no)	0.0001	10.6	2.7	0.0001
Child enjoys reading	(yes cf no)	0.017	10.1	3.8	0.009
At home uses proportions (other than ½ and ¼)	(yes cf no)	0.0002	9.6	2.5	0.0002
Helps out at home	(sometimes cf always)	0.005	9.3	3.4	0.007
At home tells the time	(yes cf no)	0.034	9.2	4.3	0.034
Family computer ownership at age 8	(yes cf no)	0.004	8.3		0.004

Each of these factors continues to make a separate contribution to children's scores after allowing for all the other factors in the group. After allowing for the full set, we find no remaining association with family income (current and previous), or maternal qualification. Thus these activities can mitigate any disadvantage associated with low income or parental educational levels.

It is interesting that more skills-based mathematics activities which had shown some positive associations with children's competency levels when they were younger, such as playing board or card games, no longer did at age 10. These activities also had social skills aspects. It is now the application of knowledge (including times-tables), and engaging with concrete goals and problems independently, as well as in a social context, which appear important.

An earlier model which did not take computer access or use factors into account included two other mathematics activities: using a scale for weighing, and using a ruler to measure. Computer ownership at age 8 over-rode these two factors, indicating that children with earlier access to computers were also more likely to be engaged in practical mathematics use. When we looked at the scores of the children who were engaging in these two mathematics activities, plus the three identified in the final model described above, we found that while fewer children from low income homes were likely to do all 5 activities, the average score of those who did was as high as the children from high income homes who did all 5 activities, with the exception of three children who always helped out at home.

Children who always have to help out at home have less time for activities where they need to think to apply something learnt at school to something in their own environment (e.g. measuring), and less time to widen their world and find out new things, or indirectly appreciate structure and pattern by reading.

PAT Reading Comprehension

Children's reading comprehension levels at age 10 also showed associations with many of the factors we analysed. Nineteen factors of the 109 that showed associations with more than a 6 percentage point difference had impacts that came into our 'very large impact' category (slightly fewer than the 26/110 for Mathematics), 33 came into the 'large impact' category, and 59 into the 'moderate' category.

Table 149

PAT Reading Comprehension: Factors Showing a Very Large Impact

Number of levels	Factor in order of association by size of largest observed significant sub-group difference ↓	Factor levels with generally low performance	Factor levels with middling performance	Factor levels with generally high performance	largest observed difference	s.e of given difference	% variance acct. for
5 levels	Overall achievement level	1	the rest	5	49.8	6.5	38.8
4 levels	Child gets treated fairly at home	never	sometimes	often/always	26.7	7.6	4.7
6 levels	ECE type near age 5	A'oga Amata		all others	26.5	7.7	2.6
6 levels	Mother's qualification	none	mid school-tertiary	university	26.1	3.2	13.9
6 levels	Parental TV watching when child 8	≥4 hours	<4 hours	none	25.9	6.4	4.3
4 levels	At school, I get a hard time	always	often	never/sometimes	25.4	6.9	3.0
4 levels	Socio-economic mix of ECE	low income	wide/low-middle income	middle-class	25.1	4.3	14.1
5 levels	Child daily TV watching age 8	≥2 hours	<2 hrs	none	24.6	6.6	6.6
5 levels	Child daily TV watching age 10	≥2 hours	<2 hrs	none	23.1	5.9	7.7
9 levels	Changes in family income	low – low low - >$30-$50K/low - >$50K	other movements	high to high	22.5	5.4	10.6
3 levels	Paternal occupation at birth of 1st child	unskilled	skilled	professional	22.0	4.5	10.8
5 levels	Child daily TV watching, age 5	≥3 hours	<3 hours	none	22.0	6.8	7.1
5 levels	Child daily TV watching age 6	≥3 hours	1-(3) hrs	up to 1 hour	20.7	6.1	5.4
3 levels	Child enjoys reading	no/qual.yes		yes	20.2	2.4	16.7
6 levels	Parental TV watching when child 10	≥3 hours	1 – (3) hrs	up to 1 hour	19.7	5.4	3.9
4 levels	Child helps out at home	never	always	often/sometimes	19.2	6.5	3.8
3 levels	Paternal occupation when child is 10	unskilled	skilled	professional	19.1	3.5	9.4
4 levels	Family Income at age 5	≤$30K	>$30K-$70K	>$70K	18.4	2.8	9.6
5 levels	Teacher's view of family support for schoolwork	little/none	some/good/ don't know	fantastic	18.2	3.5	7.4
4 levels	Child gets bored at home	always	often/never	sometimes	18.1	4.1	6.0

Family socio-economic characteristics are, as one would expect, marked; though in a slightly different form from the characteristics having the largest impact with Mathematics. Here maternal occupational status, both previous and current, has a large rather than very large bearing on children's scores. But income levels are more marked.

Television watching looms very large, with children's age 5 and age 6 time spent watching television added to their and their parents' current and age 8 habits. More than three hours a day on average at ages 5 and 6,when children are still coming to grips with reading, and more than two hours a day when they can read, appears to block the development of reading comprehension, of being able to read for meaning.

The child who has come to enjoy reading by age 10 is more likely to do well in reading comprehension. It is the enjoyment, reflecting the previous mastery of basic skills, which matters more than particular styles or structures of writing—these show moderate rather than large impacts.

It is interesting to compare patterns of children's enjoyment—as reported by parents for reading and mathematics—with the impact it has on PAT Reading Comprehension and Mathematics scores. While children's enjoyment of patterns shows in their Reading Comprehension scores, it does not show in their Mathematics scores; their enjoyment of reading, however, counts much the same for both. The difference made by the enjoyment of number on children's Mathematics scores is similar to its impact on their PAT Reading Comprehension scores.

Table 150

Children's Enjoyment: PAT Reading Comprehension and Mathematics Compared

	PAT Reading Comprehension			Mathematics	
	Largest difference	% variance		Largest difference	% variance
Enjoys reading	20.2	16.7	Enjoys reading	17.0	9.0
Enjoys patterns	11.7	7.3	Enjoys numbers	10.8	3.5
Enjoys school	8.3	2.7	Enjoys school	7.8	2.5
Enjoys writing	6.9	2.4			
Enjoys numbers	6.1	1.1			

Will future phases of the Competent Children project show that the enjoyment of writing becomes more strongly associated with reading comprehension, as the study children become as confident in writing as they were with reading at age 10, and move to its use in their everyday lives, rather than something new, requiring constant attention in its own right? Or will it show that in fact writing continues to exert this demand, and it is this which distinguishes it from the other face of the literacy coin?

Early childhood education socio-economic mix and type feature in the factors having a very large impact for reading comprehension too, but early childhood education quality features have moderate rather than large impacts.

Table 151

PAT Reading Comprehension: Factors Showing a Large Impact

Number of levels	Factor in order of association by size of largest observed significant sub-group difference ↓	Factor levels with generally low performance	Factor levels with middling performance	Factor levels with generally high performance	largest observed difference	s.e of given difference	% variance acct. for
4 levels	ECE print saturated	1st quartile		>1st quartile	17.6	4.4	7.9
4 levels	Family inome at age 8	≤$30K	>$30K-$70K	>$70K	17.5	2.7	9.1
2 levels	Home maths - tells time correctly	no		yes	17.4	3.2	5.5
3 levels	Maternal occupation at birth of 1st child	unskilled	skilled	professional	17.3	4.5	6.7
2 levels	English 2nd language age 5	yes		no	16.9	4.9	2.4
4 levels	Available income per person in household	up to $3800	in between	>$8900	16.4	3.0	8.0
4 levels	Child feels lonely at home	often/always	never	sometimes	16.4	5.3	2.6
2 levels	Home reading – instructions	no		yes	16.3	2.9	5.8
2 levels	Home reading – fiction	no		yes	16.2	3.2	5.0
5 levels	School decile	1–2	3–8	9–10	16.2	3.3	6.6
4 levels	Child's ethnicity	Pacific Island	Maori	Pakeha/Asian	16.0	4.2	4.0
2 levels	Fine arts lessons out of school	no extra lessons		fine arts	15.6	5.2	3.4
4 levels	Family asks child about school	never	sometimes	always/often	15.6	5.2	2.3
3 levels	Feeling doing well at school through what I learn making sense	disagree	agree	not sure	15.6	5.9	1.5
3 levels	Maternal occupation when child is 10	unskilled	skilled	professional	15.5	3.2	7.0
4 levels	Parental support	little	some/good	fantastic	15.2	4.7	2.7
2 levels	Home maths - does × tables up to 10	no		yes	14.9	2.3	8.0
3 levels	Homework	no	varies	yes	14.9	3.8	4.1
4 levels	At school, teacher treats me fairly	sometimes/never	often	always	14.9	7.0	2.0
3 levels	Child's rating of their class for cohesiveness	high	medium	low	14.8	2.5	6.8
2 levels	Home maths - can work out halves & quarters	no		yes	14.8	2.8	5.2
2 levels	Home maths - adds money correctly	no		yes	14.7	3.8	2.9
4 levels	Child gets told off at home	always	never	often/sometimes	14.0	4.0	
3 levels	Feeling doing well at school through solving a problem by working hard	disagree	not sure	agree	14.0	5.1	1.6
3 levels	Child's rating of their class for difficulty	high	medium	low	13.5	2.3	6.7
4 levels	Family income at age 10	≤$30K	>$30K-70K	>$70K	13.4	2.8	5.4
2 levels	Age 10 computer ownership	no		yes	13.2	2.3	6.1
5 levels	Frequency of getting books from public library	irregular/ don't know		three weekly	12.7	3.4	5.3
3 levels	At school, child feels sad	often	never	sometimes	12.7	4.5	2.1
5 levels	Welfare history in last 5 years	other benefit ≤5 year	DPB for any length of time/other benefit >5yr	not on benefit at age 10	12.7	5.4	3.6
4 levels	Child gets help at home if help needed	sometimes		always/often	12.6	3.1	3.3
2 levels	Performing arts lessons out of school	no extra lessons		perf.arts lessons	12.3	2.1	7.8
4 levels	ECE staff guided chn in activities	<4th quartile		4th quartile	12.1	3.8	4.3

Multifactor Modelling of the Variance in PAT Reading Comprehension Scores at Age 10

Some of the activities which appear to be key (or key indicators of others) for Mathematics are also apparent for the PAT Reading Comprehension test. It is interesting that some mathematical activities emerge as key—ones showing some appreciation of pattern and logic. The enjoyment of reading and its inclusion in regular activity outside school count, as does its use in doing homework. Exposure to print, and the value placed on written material in a child's final early childhood education setting, also continue to feature, five years later. Family computer ownership may point to a further inclusion of reading in desirable activities, and, besides this use, may embody family emphases on the use of literacy in everyday life, and the importance of extending knowledge.

This model accounted for 57 percent of the variance between children's PAT scores.[98]

Table 152

Effects of Factors in a Model for PAT Reading Comprehension at Age 10

Factor (comparison in brackets)		p-value from ANOVA with this factor fitted last	Size of largest difference (% points advantage)	s.e. of this diff.	prob for this difference
Television watching at age 10	(none cf 2-3 hours daily)	0.004	16.7	5.3	0.002
Homework	(yes cf no)	0.002	16.2	4.6	0.0005
Parental support for class	(fantastic cf little)	0.035	13.9	5.1	0.007
Child feels they are doing well at school through solving a problem by working hard	(agree cf not sure)	0.006	13.0	4.1	0.002
Child enjoys reading	(yes cf qual. yes/no)	0.00007	11.2	3.0	0.0002
Computer ownership at age 10	(yes cf no)	0.00009	10.6	2.6	0.00009
Socio-economic status of the ECE	(middle-class cf low income)	0.0002	9.2	2.6	0.0004
ECE was a print-saturated environment	(3rd quartile rating cf 1st quartile rating)	0.008	9.2	2.7	0.0008
Child read library books at age 6	(yes cf no)	0.001	8.6	2.6	0.001
At home uses proportions other than ½ and ¼	(yes cf no)	0.018	5.2	2.2	0.018
Home maths – tables over 10	(yes cf no)	0.037	4.6	2.2	0.037

Again, each of these factors made a separate contribution after the other factors in the group had been allowed for, and there were no further effects for family income or maternal qualification. That is, these factors can be thought of as some of the factors which underlie or provide the patterns and habits behind the broad factors of family income and parental qualification levels. What that also means is that these factors are also ones which can mitigate the disadvantage of low family income or lack of parental qualifications.

Perseverance

While children's Perseverance scores were associated with 120 of the factors, most of these associations were moderate (74).

Only 4 factors[99] showed a very large impact on children's Perseverance scores at age 10: changes in family income (or the persistence of family income levels – it is interesting that the children whose families had to adjust to much lower incomes had higher scores for Perseverance), homework, family support for schoolwork (as judged by teachers), and whether the child felt they were given a hard time. Thus children who were disengaged from school work, and who did not find a place for it in their home life, scored lower than others. It is interesting that television watching did not appear in this set of factors with a very large impact on children's Perseverance scores at age 10.

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[98] An earlier model which did not include computer ownership or activities contained the other factors reported here, but in a different arrangement. (See Wylie, C. (2001). Competent Children: findings and issues from the first 7 years. On www.nzcer.org.nz)

[99] Other than teacher's assessment of overall performance (as with the other competencies).

Table 153

Perseverance Score: Factors Showing a Very Large Impact

Number of levels	Factor in order of association by size of largest observed significant sub-group difference ↓	Factor levels with generally low performance	Factor levels with middling performance	Factor levels with generally high performance	Largest obs. diff.	s.e of given diff.	% variance acct. for
5 levels	Overall achievement level	slow	the rest	v.good/excellent	53.7	5.3	37.4
9 levels	Changes in family income	low->$50K	other movements	high to low	27.5	10.5	6.3
3 levels	Homework	no	varies	yes	26.6	2.6	18.3
4 levels	At school, I get a hard time	always	sometimes/often	never	26.3	6.2	5.9
5 levels	Teacher's view of family support for schoolwork	little or none	some/good/ don't know	fantastic	23.5	3.0	16.1

The set of factors which had a large impact on children's Perseverance scores were reasonably diverse, but with some focus on children's happiness or confidence. Here we see that children who score well on Perseverance cope with upsets, are not part of bullying, keep out of trouble at school, have their friends home to play, feel they are doing well at school because they work hard—but not that they could do better work through (further) effort. They are more likely to enjoy reading, and to have watched less than an hour's television a day when they were aged 6.

Table 154

Perseverance Score: Factors Showing a Large Impact

Number of levels	Factor in order of association by size of largest observed significant sub-group difference ↓	Factor levels with generally low performance	Factor levels with middling performance	Factor levels with generally high performance	Largest obs. diff.	s.e of given diff.	% variance acct. for
4 levels	Child helps out at home	never	always	often/sometimes	16.9	5.5	3.2
4 levels	How child copes with upset	upsets, not coping		no upsets/upsets but copes/coping varies	16.8	4.8	2.4
4 levels	Child gets treated fairly at home	never	sometimes	often/always	16.8	7.0	1.6
4 levels	Bullying	bully & victim	bully/victim	neither	16.7	3.0	8.3
5 levels	Child daily TV watching, age 6	≥2 hours	1 – (2) hours	up to 1 hour	14.6	5.4	3.2
4 levels	Child has friends home to play	never	always/ sometimes	often	14.1	5.6	2.2
3 levels	Mat.occupation at birth of 1st child	unskilled	skilled	professional	14.0	4.1	5.0
2 levels	Home maths - does × tables up to 10	no		yes	13.8	2.0	8.4
3 levels	Child enjoys reading	no	qualified yes	yes	13.8	2.3	7.7
4 levels	At school, I could do better work if I tried	always/often	sometimes	never	13.4	3.8	3.4
3 levels	Feeling doing well at school through hard work	disagree	not sure	agree	13.4	5.1	2.4
3 levels	At school, child keeps out of trouble	sometimes	often	always	13.1	2.1	7.4

Unlike Mathematics and the PAT Reading Comprehension test, family socio-economic factors were hardly evident—nor were school or early childhood education student socio-economic mix. The only factor of this kind to show was the maternal occupation at the birth of the family's first child.

Multifactor Modelling of the Variance in Children's Perseverance Scores at Age 10

The model below accounts for 51 percent of the variance in children's scores on our Perseverance measure at age 10. Children who experience unfair treatment, bullying, or trouble at school are unlikely to persevere. Nor are they likely to see home as a place for learning: homework is less likely to be completed, Mathematics used, and reading enjoyed. They may not have access to a computer. Both music and mastering times-tables call on discipline. With practice, making an effort becomes habitual, and therefore, less burdensome or extraneous.

Gender does make its own contribution to differences between Perseverance scores at age 10.

Table 155

Effects of Factors in a Model for Perseverance at Age 10 (squared model)

Factor (comparison in brackets)		p-value from ANOVA with this factor fitted last	size of largest difference	approx s.e. of this diff.	prob for this difference
Homework	(yes cf no)	0	20.6	3.7	0.00000005
At school teacher treats me fairly	(always or often cf sometimes)	0.0000002	15.1	2.8	0.0000001
At school I could do better if I tried	(never cf often)	0.015	10.5	3.4	0.002
TV watching at age 8	(2 hours or more cf none)	0.042	10.1	4.1	0.013
Child enjoys patterns	(yes cf qual.yes)	0.004	9.3	2.9	0.002
Bullying	(neither bully nor victim cf bully&victim)	0.013	8.0	3.5	0.010
Child enjoys reading	(yes cf no/qual.yes)	0.004	7.4	2.3	0.001
Computer ownership at age 10	(yes cf no)	0.009	5.3	2.0	0.009
Home maths – tables up to 10	(yes cf no)	0.008	5.0	1.9	0.008
Gender	(female cf male)	0.004	4.6	1.6	0.004
Child plays music/sings	(yes cf no)	0.011	4.5	1.8	0.011
At school child keeps out of trouble	(always cf often)	0.067	3.8	1.6	0.021
Home maths, uses proportions other than½ and ¼	(yes cf no)	0.009	3.6	1.4	0.009

Family income, maternal qualification, and parental occupations, both current and at the birth of the family's first child, added nothing further to this model.

Communication

Only two factors showed very large impacts on children's Communication scores at age 10: their sense that they got a hard time at school, and the teacher's view of their family's support for school work. Ten factors showed large impacts. Most of these are related to children's home experiences and interactions with others there. Children were likely to score well for Communication if they felt treated fairly at home, had their friends and relatives often around to their home, coped with any upsets, enjoyed reading, watched less than 2 hours television a day when aged 6, and did their homework all the time. They were likely to have English as their first language, and to have stayed in one school since they started school.

Table 156

Communication Score: Factors Showing a Very Large Impact

Number of levels	Factor in order of association by size of largest observed significant sub-group difference ↓	Factor levels with generally low performance	Factor levels with middling performance	Factor levels with generally high performance	Largest obs. diff.	s.e of given diff.	% variance acct. for
5 levels	Overall achievement level	lowest	the rest	highest	50.4	5.0	43.8
4 levels	At school, I get a hard time	always	sometimes/ often	never	21.9	5.9	4.8
5 levels	Teacher's view of family support for schoolwork	little/none	some/good/ don't know	fantastic	18.3	2.6	15.8

Table 157

Communication Score: Factors Showing a Very Large Impact

Number of levels	Factor in order of association by size of largest observed significant sub-group difference ↓	Factor levels with generally low performance	Factor levels with middling performance	Factor levels with middling performance	Largest obs. diff.	s.e of given diff.	% variance acct. for
4 levels	Child gets treated fairly at home	never	often/ sometimes	always	17.2	6.7	1.9
3 levels	Homework	no	varies	yes	16.2	3.1	8.2
4 levels	Child has friends home to play	never	always/ sometimes	often	16.0	5.1	3.4
4 levels	How child copes with upset	upsets, not coping		no upsets/upsets but copes/ coping varies	14.9	4.2	2.6
4 levels	Relatives come to the home	never	always/ sometimes	often	14.7	4.0	2.7
6 levels	Welfare persistence in last 2 years	other benefit ≤2 yr	benefit > 2yr	none/some in last 2yr	14.3	4.8	3.2
2 levels	English 2nd language age 10	yes		no	13.5	4.2	2.0
3 levels	Child enjoys reading	no	qualified yes	yes	13.4	1.8	11.0
4 levels	Mobility between schools	4 or more	2 or 3	1 school	13.1	5.0	1.7
5 levels	Child daily TV watching age 6	≥3 hours	2 – (3) hrs	<2 hours	13.1	5.2	3.3

A total of 85 factors had moderate impact on children's communication scores at age 10.

Multifactor Modelling of the Variance in Children's Communication Scores at Age 10

The model below accounts for 42 percent of the variance in children's Communication scores. This model finds more emphasis than did the summary tables in some school experiences, showing that disengagement from school work hinders both listening and talking. Use of language in the particular form of poetry and enjoyment of language through reading do matter. Participation in music is likely to aid the development of listening skills. Interactions with friends at home remain important, but interaction with adults at home does not feature in this model—though having to help out at home all the time does not improve listening and talking skills.

Table 158

Effects of Factors in a Model for Communication at Age 10

Factor (comparison in brackets)		p-value from ANOVA with this factor fitted last	size of largest difference	Approx s.e. of this diff.	prob for this difference
Child has friends to play at home	(often cf never)	0.0002	14.9	4.7	0.001
Homework	(yes cf no)	0.0000002	12.4	2.7	0.000006
Child upset or not and how she/he copes	(no upsets/upsets but coping/upsets, coping varies cf upsets not coping)	0.012	10.7	3.3	0.001
Child helps out at home	(never cf always)	0.033	9.3	4.5	0.040
Child enjoys reading	(yes cf no/qual.yes)	0.000005	8.6	1.8	0.000002
Child could do better if she/he tried	(never cf often)	0.005	8.6	2.7	0.002
At school child feels restless	(sometimes cf always)	0.018	7.5	3.4	0.028
Child gets a hard time at school	(never cf often)	0.023	6.9	2.4	0.004
Home maths – tables up to 10	(yes cf no)	0.0002	6.1	1.6	0.0002
At school teacher helps when needed	(often cf sometimes)	0.047	6.0	2.4	0.015
Home writing – poems	(yes cf no)	0.0003	5.0	1.4	0.003
Child feels they are doing well at school when it makes them work hard	(agree cf it depends)	0.051	4.7	2.0	0.016
Child feels they are doing well at school when it makes them think	(agree cf it depends)	0.040	4.0	1.7	0.020
Child plays a musical instrument	(yes cf no)	0.004	3.9	1.3	0.004

Family income and maternal qualification did not add anything extra to this model.

Individual Responsibility

On the whole, fewer factors showed an impact on Individual Responsibility than for the other 4 competencies we have looked at through the summary tables and multifactor modelling. Four factors showed a very large impact on children's Individual Responsibility scores at age 10, and 16 more showed large impacts. Sixty-six factors showed moderate impacts.

Table 159

Individual Responsibility Score: Factors Showing a Very Large Impact

Number of levels	Factor in order of association by size of largest observed significant sub-group difference ↓	Factor levels with generally low performance	Factor levels with middling performance	Factor levels with generally high performance	Largest obs differnce	s.e of given diff.	% var acct. for
5 levels	Overall achievement level	lowest	the rest	highest	46.4	5.5	28.5
3 levels	Homework	no	varies	yes	28.4	3.1	20.5
5 levels	Teacher's view of family support for schoolwork	little/none	some/good/ don't know	fantastic	25.6	2.9	20.3
4 levels	At school, I get a hard time	always	sometimes/ often	never	21.1	6.0	4.1
4 levels	Bullying	bully & victim	bully	neither/victim	20.7	2.9	14.2

Table 160

Individual Responsibility Score: Factors Showing a Large Impact

Number of levels	Factor in order of association by size of largest observed significant sub-group difference ↓	Factor levels with generally low performance	Factor levels with middling performance	Factor levels with generally high performance	Largest obs. diff.	s.e of given diff.	% variance acct. for
2 levels	Gender	male		female	15.7	1.5	17.1
3 levels	At school, child keeps out of trouble	sometimes	often	always	15.4	2.0	12.0
4 levels	How child copes with upset	upsets, not coping		no upsets/ upsets but copes/ coping varies	15.4	4.7	2.3
5 levels	Welfare history in last 5 years	any benefit > 5 yr	other benefit ≤5 yr	not on benefit at age 10 or DPB ≤5 year	15.1	5.0	4.3
4 levels	Child has friends home to play	never	always/ sometimes	often	14.9	5.4	2.6
3 levels	Child enjoys writing	no		yes/qual.yes	14.4	1.9	12.5
3 levels	Child enjoys reading	no	qualified yes	yes	14.2	2.2	9.5
3 levels	Feeling doing well at school through doing very best	not sure		disagree/agree	14.2	5.5	3.0
2 levels	Home maths - can use calculator for addition & subtraction	no		yes	14.1	3.3	3.5
5 levels	Child daily TV watching, age 6	≥3 hours		up to 3 hours	13.7	5.2	3.1
2 levels	Home reading – fiction	no		Yes	13.4	2.8	4.5
4 levels	Teacher's view of relationship with parent	satisfactory/ difficult/none	good	v.good/ excellent	13.3	2.5	7.3
4 levels	At school, teacher treats me fairly	sometimes/ never	often	always	13.2	2.6	4.9
4 levels	Child helps out at home	never	always	often/sometimes	13.1	5.4	1.5

Always completing homework, never getting a hard time at school or being part of bullying, and having great family support for school work allowed children to score well for Individual Responsibility. Among the group of factors having a large impact, gender emerges for the first time in this overview of the associations between factors of children's lives and their competencies. Looking at this group, we find an interesting mix of factors. Children who are likely to have higher scores for Individual Responsibility tend to be girls, to keep out of trouble, cope if they are upset, have friends around to play, feel they are treated fairly at school, and feel that if they are doing their very best, they are doing well at school. They enjoy reading, particularly fiction—and writing. They use a calculator at home, and watched less than 3 hours television a day at age 6. Their teacher feels they have a very good or excellent relationship with their parents, and their parents have not received a state benefit.

Multifactor Modelling of the Variance in Children's Individual Responsibility Scores at Age 10

The model below accounts for 59 percent of the variance in children's Individual Responsibility scores at age 10. Family income and parental occupations, both current and when the first child in the family was born, had no associations—but maternal qualification did. Gender also showed here on its own, probably as an 'umbrella' factor indicating the differences in the overall patterns of interests and reactions for the boys and girls in the study. This may have mopped up some of the individual factors which appear in the multifactor models for the two other attitudinal competencies, Perseverance and Communication. Enjoyment of writing requires the habit of absorption in a task, while being aware of the shape and purpose of the task. Disengagement from school, or finding school a place to get into trouble and focus on relations of power, through involvement in bullying, also work against developing strengths of absorption and focus on a task. The appearance in this model of the factors of having responsive ECE staff and mothers with some educational qualifications may well be consistent with the theme coming through this chapter of the importance of establishing habits of engagement early on—in this case, identifying and providing tasks or projects which appeal to a particular child.

Table 161

Effects of Factors in a Model for Individual Responsibility at Age 10

Factor (comparison in brackets)		p-value from ANOVA with this factor fitted last	size of largest difference	approx s.e. of this diff.	prob for this difference
Homework	(yes cf no)	0.000000005	20.5	3.6	0.00000005
Bullying*	(victim cf bully & victim)	0.002	14.7	4.2	0.0006
Gender	(female cf male)	0.000000006	11.8	2.1	0.00000006
Mother's qualification	(tertiary cf none)	0.038	9.2	3.4	0.007
Child enjoys writing	(yes cf no/qual. yes)	0.008	6.7	2.4	0.005
Home maths – tables over 10	(yes cf no)	0.0006	6.5	1.9	0.0006
Child keeps out of trouble at school	(always cf often)	0.032	5.6	2.1	0.009
ECE staff were responsive	(4th quartile cf 2nd quartile)	0.063	5.6	2.4	0.023
Computer ownership at age 10	(yes cf no)	0.055	4.4	2.3	0.055

* The percentage point difference between having no part in bullying, either as bully or victim, and being both bully and victim was 11.5, s.e.=3.3, p=0.0005.

Taking Previous Performance into Account

Children's prior performance can be read as a factor which summarises their growth to that point, and embodies the impact of a host of the factors—experiences and resources, and initial temperament—which influenced that prior performance. It is particularly important to include prior performance in studies which focus on added-value of educational institutions, and characteristics such as school student socio-economic mix.

We undertook two kinds of modelling incorporating the children's performance prior to age 10, each using their score on the Composite Cognitive Competency measure at each age. At age 5, this measure was the mean of their three scores for Mathematics, early literacy, and Logical Problem-Solving. At age 6, this measure was the average of their four scores for Mathematics, Logical Problem-Solving, and the two literacy measures used, the Burt Word Reading test, and invented spelling. At ages 8 and 10, the Composite Cognitive Competency was the average of a child's scores for Mathematics, Logical Problem-Solving, the average of the two reading tasks, the Burt Word Reading test and the PAT Reading Comprehension test, and writing. This composite measure gives roughly equal weight to literacy and numeracy.

Previous Composite Cognitive Competency scores alone can account for quite a lot of the variance, or spread, of student scores in the Composite Cognitive Competency score at age 10.

Table 162

Proportion of Age 10 Scores Variance Accounted for by Previous Composite Cognitive Scores

	% of variance of mean cognitive competency score age 10 accounted for by previous cognitive competency score
Age5	34
Age 6	53
Age 8	70

Looking simply at previous scores provides some information, but does not on its own shed much light on the children's development, or why different patterns are evident, since previous scores subsume other factors. However, it is consistent with our analyses of competency development in Chapters 3 and 4, which show that the window of opportunity for laying down some of the basic Mathematics and Literacy knowledge and skills narrows after age 8.

The multifactor models which we used next were designed to find the most parsimonious accounting for the variance in children's Composite Cognitive Competency scores at age 10. We undertook some preliminary modelling using limited sets of the factors which showed the most association with children's cognitive competencies. Each of these models included maternal qualification and family income at age 5, and then included notable factors from one of the main strands of children's experience: family and school resources; early childhood education; family and peer support; school support. We hoped from this to derive a set of factors which would draw on these different strands, so that the comparative weight of each strand could be gauged. What the modelling produced was a clear picture of the intertwined nature of even key factors.

We therefore moved away from the idea of pre-selection of key factors to include in this final model, and used all the factors which had been included in the preliminary models in three separate models, with children's Composite Cognitive Competency scores at ages 5, 6, and 8. The factors which appear here are the ones which overlap least with others, and which can be thought of as underpinning others—or to be the dimension of another factor which may account for its strength of impact in one–factor modelling.

The overall picture they provide can give insight into some of the key processes or principles underpinning children's progress in literacy, mathematics, and logical problem-solving since the prior age included in the model. But bear in mind that none of these models accounts for all of the variance in children's scores,[100] and that we have not been able to include in the Competent Children project some important factors related to school experience, such as the curriculum covered by children, and the quality of the teaching they have experienced at school.

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[100] We also repeated this modelling for the age 10 composite social and attitudinal competency. The age 5 composite social and attitudinal competency accounted for only 12 percent of the variance between children's scores at age 10. Adding the other factors allowed an accounting for only 21 percent of the variance, with most of this coming from the factor *I am treated fairly at school.*

The factors included in the models are:

Maternal qualification
Family income age 5
Ethnicity
Treated fairly at home
Get help needed at home
Family support for schoolwork

Television watching age 10
Child enjoys reading
Child completes homework

Computer ownership ages 5, 8,10
Computer activities age 8, 10

ECE socio-economic mix
ECE staff were responsive
ECE staff asked open-ended questions
ECE centre was print-saturated
Length of ECE attendance

School decile
Treated fairly by teacher
Gets help needed at school
Parental support for schoolwork in the classroom

Progress since Age 5

By including these resource and experiential factors, we can explain a further 27 percent of the variance in children's scores beyond the age 5 scores, giving a total of 61 percent.

Table 163

Age 5 Composite Cognitive Composite and Key Factors in a Model for the Composite Cognitive Competency at Age 10

Factor (comparison in brackets)		p-value from ANOVA with this factor fitted last	size of largest advantage	approx s.e. of this diff.	prob for this advantage
Composite Cognitive Competency at age 5		0	N/A	N/A	N/A
TV watching at age 10	(none cf 2–3 hrs)	0.002	12.8	3.3	0.00009
Homework	(yes cf no)	0.00007	12.7	3.1	0.00003
Mother's education at the birth of first child	(univ/tertiary cf none)	0.0009	8.8	2.4	0.0002
Child enjoys reading	(yes cf qual yes/no)	0.00001	6.9	1.7	0.00004
ECE staff asked open-ended questions to encourage own answers	(3rd quartile cf 1st quartile)	0.009	5.0	1.5	0.0004
Child gets the help needed at school	(often cf sometimes)	0.025	4.7	1.8	0.004
Computer ownership at age 10	yes cf no)	0.026	3.6	1.6	0.013

The early childhood education, family income, and school decile factors were subsumed within the remaining group of factors when we fitted all the other factors in this set first: that is, their contribution was no longer separable. This tells us something about the way these factors clustered together. It also shows the importance of parental education levels, and the child's own actions and habits, including the development of reading for enjoyment, in making progress from age 5 to age 10.

Progress since Age 6

The model below accounted for 70 percent of the variance in children's age 10 Composite Cognitive Competency scores, or an additional 17 percent on top of the age 6 score.

Table 164

Age 6 Composite Cognitive Competency and Key Factors in a Model for the Composite Cognitive Competency at Age 10

Factor (comparison in brackets)		p-value from ANOVA with this factor fitted last	size of largest advantage	approx s.e. of this diff.	prob for this advantage
Composite Cognitive Competency at age 6		0	N/A	N/A	N/A
Homework	(yes cf no)	0.000009	11.2	2.5	0.000006
Television watching at age 10	(none cf 2-3 hrs)	0.003	10.6	2.9	0.0001
Mother's education at the birth of first child	(univ cf none)	0.0009	8.1	2.0	0.00005
Child enjoys reading	(yes cf qual yes or no)	0.002	4.4	1.5	0.002
ECE staff asked open-ended questions to encourage own answers	(3rd quartile cf 1st quartile)	0.017	4.0	1.3	0.0007
Computer ownership at age 10	(yes cf no)	0.015	3.3	1.4	0.007

School decile was the only factor of this set which did not remain as making a separate contribution after fitting each factor after all the others in turn. It is interesting that an aspect of early childhood education experience can be seen to make a separate contribution to the spread of children's scores between ages 6 and 10. The other key factors here all underline again the importance of children building habits which allow them to spend their time fruitfully and actively. These factors do make a difference to children's learning, over and above their interactions with adults.

Progress since Age 8

The model which used the age 8 Composite Cognitive Competency measure with experiential and resource factors accounted for 81 percent of the variance, another 11 percent on top of the age 8 mean Composite Cognitive Competency score. These are the factors which have the strongest influence on children's further development between ages 8 and 10. Bear in mind that the ECE socio-economic mix also stands for some aspects of early childhood education quality.

Table 165

Age 8 Composite Cognitive Competency and Key Factors in a Model for the Composite Cognitive Competency at Age 10

Factor (comparison in brackets)		p-value from ANOVA with this factor fitted last	size of largest advantage	approx s.e. of this diff.	prob for this advantage
Composite Cognitive Competency at age 8		0	N/A	N/A	N/A
TV watching at age 10	(none cf 2–3 hrs)	0.0003	9.1	2.1	0.000008
Homework	(yes cf no)	0.0005	7.0	1.8	0.00008
Socio-economic mix of ECE	(middle-class cf low income)	0.002	5.3	1.4	0.0001

It is interesting that early childhood education factors were not apparent in the model using the age 5 score, but do emerge using later scores, when one would think their contribution would be subsumed by the later scores—if each factor made its strongest contribution at the time it occurred, or shortly afterwards. It would seem that this is not so in relation to children's progress over time: that factors can be 'sleepers', either having some effect which is not clearly visible because they are subsumed in other, broader factors, or not always having the same effect through time.

Note that family income effects have gone off the centre stage. This does not mean that family income levels do not matter, but that they are subsumed within this group of factors (including previous performance).

When we developed a model of the factors which might account for the variation in children's age 5 Composite Cognitive Competency scores, early childhood education quality did not figure, probably because it was subsumed by early childhood education socio-economic mix. The factors we used were ones which were most strongly associated with children's competency levels at age 5:

family income age 5
mother's education
mother's occupation
father's occupation

the 20 ECE quality factors
ECE socio-economic mix
ECE duration
television watching age 5
family computer ownership
knows sounds and letters age 5
home reading age 5
other home maths age 5
other home writing activities at age 5

The model using these factors accounted for 22 percent of the variance in children's age 5 Composite Cognitive Competency scores. From this set of factors, only 4 emerged as making a separable contribution beyond the other factors in the model. ECE socio-economic mix, which we have seen is associated with differences in some of the key quality indicators, had the strongest association.

Table 166

Effects of Factors in a Model for the Age 5 Cognitive Composite Score

Factor (comparison in brackets)		p-value from ANOVA with this factor fitted last	size of largest difference (% points advantage)	s.e. of this diff.	prob for this advantage
Socio-economic status of ECE	(middle-class cf low income)	0.000008	14.6	3.0	0.0000007
Home maths at age 5	(yes cf no)	0.0006	6.5	1.9	0.0003
Child knows certain sounds and letters match	(yes cf no)	0.006	5.9	2.2	0.003
Computer ownership at age 5	(yes cf no)	0.041	3.9	1.9	0.021

Summary

Three main themes are striking about these sets of strong contributors to the variance in children's competency levels at age 10.

What children do with their time outside school matters, with benefits in restricting television watching, and in encouraging activities which focus on written language, as well as using it as a vehicle (as in homework or computer use).

Children need to feel engaged with and respected at home and school. In the contemporary world, children also need some time to be children—to have time to play, and to have some freedom, or unstructured and unobligated time, rather than, for example, the pressure to be always helping in the household.

The impact of earlier teaching is also apparent in these models. The aspects of early childhood education which have a long term bearing on children's cognitive competency levels are to do with the interaction of early childhood education teachers with children: either directly, through being responsive to individual children's interests and needs, or asking open-ended questions which mean children have to think and consider before replying; or indirectly, through the early childhood education socio-economic mix, which appears to stand as an indicator of aspects of quality, including a recognition of the power of print in children's learning and later lives.

15 CONCLUSION

This report has described the patterns of progress of the children in the Competent Children project from age 5 to age 10, and provided an analysis of the aspects of their experience, direct and indirect, which can shed some light on those patterns. Longitudinal research enables us to test our assumptions about the things that matter, and why they might matter, and to see whether patterns which hold in the short term also apply over the long term.

What Matters?

Social research is often concerned with advantage or disadvantage: the differences that shape or limit individually experienced opportunity and participation. It is a truism that socio-economic circumstances play a powerful role in different patterns of experience and development. The frontiers in our understanding are now to do with charting the particular aspects of socio-economic circumstance that may explain its power. Given the seeming intractability of economic inequalities—indeed, their growth rather than diminishment (e.g. Podder & Chatterjee 1998)—it becomes increasingly important to find aspects which may mitigate these inequalities.

In this study, we find education lies at the heart of the socio-economic factors which produce and sustain advantage—high levels of parental qualification, employment which uses and builds on the knowledge and skills acquired through education, high income, which is related to the kind of employment attainable, and so back to education.

Thus if we had to boil down socio-economic advantage down to just one factor, we would opt for parental education levels, because these are also at work in the nature of the interaction between parents and children, and the activities which are 'natural' and everyday in the home. High levels of parental education are likely to result in homes where activities and interactions have strong cognitive components—involving the written word, using the written word, involving evaluating material, looking for connections and patterns, making decisions on the basis of evidence, and problem-solving. These activities build up not only knowledge and skills, but also confidence and habits which endure.

Of course, high parental education levels do not guarantee that family interactions and activities will be laced with these dimensions, and low education levels do not prevent this—but they can make it harder to provide, since parents are having to overcome their own habits. There is no doubt that parents who did not enjoy educational success themselves have to work much harder than others to support their child's cognitive development.

However, what this study also shows is that patterns of advantage anchored in socio-economic factors are on the whole confined to cognitive areas. There is no evidence that they also influence attitudes or dispositions, such as perseverance, or social skills. Like other longitudinal studies of children's progress,[101] we find no support for theories of disadvantage which assume differences in values and attitudes, such as the theory of a 'culture of poverty'. Like other studies, we also find little substance for concern about family type, maternal employment, and income source, other than situations of persistent poverty, such as that experienced by families which have received state benefits for long periods of time.

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[101] Much of this material is covered in Wylie (forthcoming).

We do need to be concerned about poverty, particularly if it occurs in the first five years of a child's life. While one might expect persistent poverty to play a notable role in children's performance levels at age 10, one unexpected finding from the Competent Children project has been that early poverty has persistent effects even when family income rises.

Early Childhood Education

Another pointer to the importance of children's early experience for their later development, particularly in the cognitive domains, is the marked contribution of aspects of early childhood education experience, five years later. Indeed, this contribution becomes more evident over time, rather than less. In the statistical analyses, the socio-economic status of the children served by a given early childhood education centre keeps emerging as a key factor. It seems to be there in its own right, but also to be standing for differences in quality in the early childhood education centres attended by the children. At age 5, these differences were not apparent when we looked at quality globally. It is when we unpacked quality into its separate items that it became clear that some aspects of quality do matter more than others for children's long term development (though these other aspects of quality have current validity, and usually support the long-lasting ones), and that children attending centres whose students were mainly from middle income families had access to centres which were more likely to rate highly on these particular aspects.[102]

The long-lasting aspects of early childhood education quality are related to how teachers interact with children, and whether they interlace warmth with cognitive content, building on children's own interests. It is this interweaving of dimensions in single actions and activities which is important. It comes through again when we look at the aspects of children's experience at school and home which account for differences between children's scores on our competency measures.

Coming to Enjoyment

The other kind of interlacing which has assumed growing importance over time is the enjoyment of cognitive activities. Of course, this could simply indicate confidence and mastery of skills; but when one sees that the children who enjoy reading are also likely to be seeking out new experiences, through use of public library resources and resources which computer access can make available, something more seems to be involved. The importance of enjoyment is also consistent with the research literature on motivation, which stresses the usefulness of responding to children's interests.

Yet enjoyment needs more teasing out. The children from homes where the mother has no qualification enjoyed school at age 10 as much as others—yet they found it much harder going. They were less accustomed to some of the work of school. How do we provide these children with the kind of alignment between school and home that middle income children enjoy? We agree with Comber and Hill (2000, p. 88):

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[102] Our material on early childhood education quality and socio-economic mix was gathered in 1993-94. Since then, there has been increased emphasis on professional development, including some of the dimensions of quality identified in the Competent Children project. Further policy changes relating to quality, and targeting more resources to centres serving children in low income areas, are also under way. A comparative study using the same measures as we used here (and others) would be very useful to gauge the impact of these policy changes on the quality of early childhood education, and on the access of children from disadvantaged groups to good quality early childhood education.

> These issues [cultural and social differences] need to be considered carefully in order to make learning literacy an extension of home language and literacy practices instead of being a site of disjunction and dislocation. Knowledge of both the lifeworlds of children and consistent, coherent engagements with print are required to ease transition through the early years.

Early childhood education centres and new entrant teachers could also work with parents to involve them in children's Literacy and Mathematics experiences, rekindling their own confidence and interest. Parents' ability to support their children in their learning does not diminish over time. Children's early experiences provide them with the ground for ongoing development, but this ground is not enough in itself. The material from the Competent Children project shows that the early years of school are indeed crucial in their own right, and certainly warrant the additional policy attention they have received in terms of the provision of interesting resources and linked professional development.

Coming to Understanding

The conclusions above are distilled from the comprehensive picture and analyses we have attempted to provide in the Competent Children project. In a longitudinal project such as this, we walk a tightrope at times: wanting the clearest possible patterns, while also wanting to respect the multidimensional reality of children's—human—lives. We are aware that the patterns we can draw out through statistical analysis do not speak for themselves, but need interpretation. We are also aware that they cannot tell the whole story. Ideally, a quantitative study such as this would be accompanied by more qualitative material, to show the processes and events which cannot be measured by quantitative data, to deepen our understanding of how these seem to the people living them, and to bring home the fact that while statistical analysis of social phenomena can provide understanding, it can also provide a neater or tighter picture than is warranted. Children's development does not follow invariant linear paths. From their own longitudinal qualitative studies of literacy, Comber & Hill concluded:

> Longitudinal research takes time and its tendency is to produce more, rather than less, complex pictures of the way things are and how they came to be that way and what this might mean for other contexts. (Comber & Hill, 2000, p. 93).

What we hope is that our work helps build the acceptance that complexity has a role in our understanding as well as in the different patterns of children's progress.

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APPENDIX 1

CHOICE OF MODELS

There are a wide range of statistical techniques available now for analysing data, and there is no single method which suits every study. The choice of method depends on the nature of the data, and the purpose of a particular study. These two aspects are often intertwined. In this study, we have used a range of methods to suit our data, and purpose, as described above.

A useful summary of some of the chief differences in approach is given in *S-Plus 2000 Guide to Statistics*, Volume 1 (1999), Data Analysis Products Division, MathSoft, Seattle, WA., p. 3:

> The process of developing a statistical model varies depending on whether you follow a classical, hypothesis-driven approach (confirmatory data analysis) or a more modern, data-driven approach (exploratory data analysis). In many data analysis projects, both approaches are frequently used. For example, in classical regression analysis, you usually examine residuals using exploratory data analytic methods for verifying whether underlying assumptions of the model hold. The goal of either approach is a model which imitates, as closely as possible the properties of the objects or phenomena being modeled. Creating a model usually involves the following steps:
>
> 1. Determine the variables to observe. In a study involving a classical modeling approach, these variables correspond to the hypothesis being tested. For data-driven modeling, these variables are the link to the phenomena being modeled.
> 2. Collect and record the data observations.
> 3. Study graphics and summaries of the collected data to discover and remove mistakes and to reveal low-dimensional relationships between variables
> 4. Choose a model describing the important relationships seen or hypothesized in the data.
> 5. Fit the model using the appropriate modeling technique.
> 6. Examine the fit using model summaries and diagnostic plots.
> 7. Repeat steps 4–6 until you are satisfied with the model.

Many statistical methods are based on assumptions of linearity, for example, that each year of education adds the same amount to a given variable. Much of our data does not take this linear form. Nor are most of our factors binary (e.g. black/non-black).

The lack of linearity in much of our data means that regression analyses and analyses based on correlation (such as cluster analysis[103]) are likely to miss important distinctions between sub-groups of a particular factor. It is important to look at the variability within factors. For example, a focus on average temperatures in the research on global climate change masked for some time the increased variability in weather, such as more severe storms. Quite a few of our factors show thresholds, separating out one sub-group from all the others.

Many of the factors in the Competent Children project are also descriptive rather than continuous. This makes them unsuitable for use in regression analyses, which need continuous variables to make the most sense.

To treat the factors in the Competent Children project as linear or binary forms would not only distort them, possibly leading to misleading results, but also lose their richness, and limit the understanding we seek. For example, if we model the factor 'child helps out at home' using regression, we could conclude that progressively less help given at home is associated with higher mathematics scores. If, on the other hand, we model these data correctly, using our modelling approach, which assumes no structure between the factor levels, we find in fact that mathematics scores are highest when moderation applies to helping out at home. Always helping out at home is associated with poorer scores—but so is never helping out at home.

Another example where regression would have masked a very interesting non-linear response which we could not have predicted is that children in our study attending decile 3–4 schools were performing as well as those attending decile 9–10 schools.

Descriptive data can be made dichotomous to fit a regression model, but the gains of doing so are sometimes questionable if the production of a single pattern comes at the cost of showing a more complex reality, for example, one where a number of different patterns and processes are at work, which could cancel each other out. For example, again consider the factor 'child helps out at home'. If we reduced that factor to simply 'at home child helps a lot' and a second level, 'at home child helps little', and fit these, we get no association. By combining our observed levels to dichotomise the factor, we have obscured all the information, as some parts have cancelled other parts out.

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[103] Nor have we have used 'effect sizes' to compare the contribution of different factors, as this measure conveys less information than we have provided with differences between groups in scores, their standard errors, and the percentage of variance accounted for. The calculation of 'effect sizes' is used to compare the impact of different factors, and sometimes to pool the results of different studies (see Wilkinson et al, 2000, for a clear outline and example). Effect size provides a ratio for the size of an effect in relation to the standard deviation (s.d.) of a given score, or the range in which 67 percent of scores are likely to fall (assuming normality). One drawback of this approach is that it does not allow for the variance between measures. For example, one ratio may be high due to a large difference between the means in the presence of a moderately-sized s.d., while another may be large due to a small difference in the means in the presence of a very small s.d. This does not matter if the comparison of effect sizes is related for a single population, so long as only factors with two levels and with no missing values were considered. There can be issues if different study results with different populations or samples are combined; it would therefore be difficult for us to use effect size to compare the contribution of a particular factor to two different competency measures, since the measures have different standard deviations.

With dichotomised variables we are less likely to see interesting patterns of interaction between factors, by the very fact that the richness of the factors has been collapsed into just two levels. For example, if we had dichotomised family income, we would not have found that while being able to tell the time was positively associated with high scores for the Burt Word Reading test for children from low income homes, it showed no associations with the scores for children from high income homes.

Another reason for choosing not to use regression analysis is that most of its forms involve a selection of key factors in terms of the proportion of variance they account for mathematically. This usually results in the inclusion of broader factors at the expense of others, and can result in a simple parade of 'the usual suspects'—such as family income and parental education. Such modelling cannot unpack these usual suspects—that is, show why they matter—because the factors which might shed such light, such as particular reading habits or use of leisure time, are likely to disappear in a regression model, since their effect may well be already incorporated in the broader factor.

The disappearance of other factors does not mean they do not matter, and have no effect. It means simply that they are highly associated. That means that if they can be considered alongside the more statistically important factors, they may provide the reasons for the overall impact of a broad factor, and point to experiences which add value, even if the broader factor plays a larger part in terms of how it accounts mathematically for the variability in the data.

Regression models which seek to select among factors, such as stepwise regression, are also dependent on being able to use all the data collected, and they should contain no missing values. Otherwise there is a real possibility of bias. This often means that the analysis is reduced to the members of the sample for whom all the data are present, which reduces the ability of the analysis to show meaningful patterns. This may not matter so much, perhaps, if the original sample was very large, but even then bias could still be introduced.

One of the great advantages of keeping the information separate as one-factor analyses is that we can use all the data we have without introducing the possibility of bias into the analysis. Bias can occur when missing values must be allowed for in several factors being considered at one time. There is no guarantee at all that the children whose results must be eliminated from such combined analyses are representative of the children in the whole study. When we look at factors singly, factors which remove some of the children from the analysis altogether (such as information about fathers, which requires that a child does have a father in the household) need only affect the one analysis where they are included. While we have done our best to ensure all data are collected in each phase of the fieldwork, missing values do accumulate over the life of a longitudinal study, and they matter more as we look back to earlier experiences to see whether they play a part in children's current performance.

APPENDIX 2

ANALYSIS OF THE RELATIONSHIPS BETWEEN COMPETENCIES

We undertook three analyses of the relationships between the competencies and children's scores on each of the competency measures. These showed consistent results.

Linear Correlation

First, we did a simple linear correlation of the scores, looking at children's scores on pairs of competencies, to see if they were close to each other. If (the correlation coefficient)=1, scores on the two measures would be a perfect match, or a simple multiple of each other. When r=0, there is no linear relationship between the two measures—a low score on one does not mean a low score will be found for the other. In social research, correlations are often found at the low end, because of the complexity of social environments.

When we analysed the relationships between children's scores for each of the competency measures, we found that Fine Motor Skills is particularly 'alone', with no correlation higher than r=0.22, a much lower level of correlation than at age 8, and closer to that at age 6.

At age 10, the children's Communication scores had the highest correlation with scores on the other competency measures, as they had at ages 6 and 8. Perseverance and Individual Responsibility were also reasonably correlated, as at age 8. Mathematics and the three reading measures also show high correlation. The full set of correlations between the competency measures is given in the table below.

Table B-1

Correlations between Pairs of Derived Competency Measures at Age 10 (n=499)
*(highest in each column **bolded**)*

	Curiosity	Perseverance	Individual Responsibility
Curiosity	1.00	0.46	0.35
Perseverance	0.46	1.00	**0.78**
Individual Responsibility	0.35	**0.78**	1.00
Social Skills with Peers	0.26	0.57	0.63
Social Skills with Adults	0.49	0.59	0.66
Communication	**0.56**	0.67	0.65
Mathematics	0.21	0.41	0.31
Fine Motor Skills	0.11	0.22	0.19
PAT Reading Comprehension	0.20	0.39	0.36
Burt Word Recognition	0.13	0.34	0.26
Writing	0.16	0.35	0.27
Reading age	0.20	0.42	0.37
Logical Problem-Solving	0.17	0.31	0.25

	Social Skills with Peers	Social Skills with Teachers	Communication
Curiosity	0.26	0.49	0.56
Perseverance	0.57	0.59	**0.67**
Individual Responsibility	**0.63**	**0.66**	0.65
Social Skills with Peers	1.00	0.53	0.49
Social Skills with Adults	0.53	1.00	0.66
Communication	0.49	**0.66**	1.00
Mathematics	0.25	0.26	0.44
Fine Motor Skills	0.17	0.12	0.19
PAT Reading Comprehension	0.29	0.31	0.49
Burt Word Recognition	0.20	0.25	0.43
Writing	0.28	0.23	0.34
Reading age	0.31	0.32	0.51
Logical Problem-Solving	0.23	0.22	0.37

	Mathematics	Fine Motor Skills	PAT
Curiosity	0.21	0.11	0.20
Perseverance	0.41	**0.22**	0.39
Individual Responsibility	0.31	0.19	0.36
Social Skills with Peers	0.25	0.17	0.29
Social Skills with Adults	0.26	0.12	0.31
Communication	0.44	0.19	0.49
Mathematics	1.00	0.21	0.67
Fine Motor Skills	0.21	1.00	0.17
PAT Reading Comprehension	**0.67**	0.17	1.00
Burt Word Recognition	0.64	0.16	**0.70**
Writing	0.37	0.19	0.45
Reading age	0.59	0.16	0.69
Logical Problem-Solving	0.63	0.20	0.55

	Burt Word Recognition	Writing	Teacher Perception of Reading Age	Logical Problem-Solving
Curiosity	0.13	0.16	0.20	0.17
Perseverance	0.34	0.35	0.42	0.31
Individual Responsibility	0.26	0.27	0.37	0.25
Social Skills with Peers	0.20	0.28	0.31	0.23
Social Skills with Adults	0.25	0.23	0.32	0.22
Communication	0.43	0.34	0.51	0.37
Mathematics	0.64	0.37	0.59	**0.63**
Fine Motor Skills	0.16	0.19	0.16	0.20
PAT Reading Comprehension	**0.70**	0.45	**0.69**	0.55
Burt Word Recognition	1.00	**0.49**	0.67	0.48
Writing	0.49	1.00	0.42	0.32
Reading age	0.67	0.42	1.00	0.49
Logical Problem-Solving	0.48	0.32	0.49	1.00

Principal Components Analysis

A principal components analysis groups factors (here, our competency measures) in linear combinations based on their relationship with each other, i.e. their correlations, and then provides an estimate of the contribution each combination makes to the overall variance (spread) of children's scores. Identifying a limited number of such linear combinations which accounted for much of the variance in children's scores could be useful in analysis. However, to be most useful, this requires finding one or two principal components which account for most of the variance.

At age 8, only one principal component explained much of the variance. This component gave the largest weightings to Communication, Perseverance, Individual Responsibility, Mathematics, and Literacy, and accounted for 45 percent of the variance.

At age 10, the same group was also identified through the principal components analysis as the competencies which made the largest contribution to an individual child's performance overall. This component accounted for 44 percent of the variance between children's scores. It effectively gave almost equal weight to each of the five competencies, and not much less to the others, suggesting that each of our competency measures provides additional information about each child. We have included this principal component in some of our one-factor modelling, but we found it produces much the same associations as our composite measure of the competencies, and therefore added little to our analyses. Had it explained a substantial proportion of the variance in children's scores, it could have been used as a substitute for the actual individual measures. However, it would have provided abstract information, which is less interpretable than specific factors in relation to specific competencies, and is not the best analytical tool for the purpose of investigating the relationships between factors and competencies.

Factor Analysis

Factor analysis is another approach to exploring similarities between different data, and is also based on assumptions of underlying shared aspects to data from different measures. It explores the ability of linear combinations of the data (here our competency measures) to capture the variability in that data. Again, its usefulness depends on how much of the variance it can account for.

Two factors were identified at both age 8 and 10, and they are very similar. The figures in bold indicate the competencies which were given most weight in the factors identified.

Table B-2

Loadings for the two Factors derived in the Factor Analysis

Competency at age 10	Factor 1 age 8	Factor 1 Age 10	Factor 2 age 8	Factor 2 age 10
Curiosity	0.11	0.11	0.50	0.52
Perseverance	0.32	0.30	**0.78**	**0.79**
Individual Responsibility	0.27	0.20	**0.80**	**0.83**
Social Skills with Peers	0.22	0.18	0.56	0.64
Social Skills with Adults	0.14	0.16	**0.76**	**0.77**
Communication	0.34	0.39	**0.77**	**0.74**
Mathematics	**0.72**	**0.78**	0.28	0.19
Fine Motor Skills	0.38	0.20	0.14	0.17
PAT Reading Comprehension	**0.79**	**0.82**	0.22	0.22
Burt Word Recognition	**0.84**	**0.82**	0.15	0.13
Writing	0.59	0.49	0.28	0.23
Reading age	**0.72**	**0.74**	0.25	0.27
Logical Problem-Solving	0.57	0.64	0.16	0.16

The cumulative variance these two factors accounted for is 53 percent, 27 percent from the first factor and 26 percent from the second. This was exactly the result at age 8 as well, and at too low a level to be taken further in the analysis of the relationship between competencies and children's experiences and resources.

This factor analysis provides a clearer distinction between competencies than the single grouping that emerged in the principal components analysis. The first factor focuses more on competencies which one could think of as primarily cognitive—Mathematics, three of the four literacy measures, and Logical Problem-Solving. The second groups together the social and attitudinal competencies—Perseverance, Individual Responsibility, Social Skills with Adults, Communication, and Social Skills with Peers.

Yet though the factor analysis implies some clear-cut distinctions, we find a more mixed picture when we look at the uniqueness of each competency measure, i.e. separating out the overlaps between them. A uniqueness score of 1 indicates no relationship at all with other competencies; and one of 0 would indicate substantial overlap. At age 10, children's scores on our measures of Individual Responsibility overlap most with their scores for the other measures – its uniqueness is only 0.17; their scores for Fine Motor Skills are least related with their scores on the other measures overall – its uniqueness is 0.93.

Table B-3

Uniqueness of the Competency Measures at age 10

Competency	Uniqueness age 10
Individual Responsibility	0.17
Communication	0.24
PAT Reading Comprehension	0.28
Perseverance	0.29
Burt Word Recognition	0.32
Mathematics	0.36
Reading age	0.38
Social Skills with Adults	0.39
Curiosity	0.43
Social Skills with Peers	0.49
Logical Problem-Solving	0.56
Writing	0.70
Fine Motor Skills	0.93

Uniqueness tables for ages 5, 6, and 8 are given below in tables B4–B6.

Table B-4

Uniqueness of the Competency Measures at Age 8

Competency	Uniqueness age 8
Individual Responsibility	*0.13*
Communication	*0.23*
Burt Word Recognition	*0.27*
Perseverance	*0.29*
PAT Reading Comprehension	0.33
Social Skills with Adults	0.39
Mathematics	0.40
Reading age	0.41
Curiosity	0.49
Social Skills with Peers	0.54
Writing	0.57
Logical Problem-Solving	0.65
Fine Motor Skills	**0.82**

Table B-5

Uniqueness of the Competency Measures at Age 6

Competency	Uniqueness age 6
Communication	0.17
Individual Responsibility	0.27
Social Skills with Adults	0.29
Curiosity	0.36
Perseverance	0.37
Number Knowledge	0.38
Burt Word Recognition	0.40
Invented Spelling	0.41
Social Skills with Peers	0.60
Logical Problem-Solving	0.77
Fine Motor Skills	0.89

Table B-6

Uniqueness of the Competency Measures at Age 5

Competency	Uniqueness age 5
Social Skills with Adults	0.27
Communication	0.29
Early Number Knowledge	0.37
Individual Responsibility	0.41
Early Literacy	0.43
Curiosity	0.56
Social Skills with Peers	0.63
Perseverance	0.64
Logical Problem-Solving	0.67
Motor Skills	0.77

APPENDIX 3

CORRELATIONS AMONG THE 21 ECE QUALITY FACTORS

Table C-1

Correlations Among the 21 ECE Quality Factors

	Staff Responsive	Staff Model behaviour	Staff Guidance for activities	Open-ended Qs	Staff Join Play	Children can select activities	Print Saturated	Experiment	Imaginative Play	Stories told	Creativity
Staff Responsive	1.00	0.68	0.69	0.72	0.63	0.31	0.36	0.15	0.09	0.37	0.27
Staff Model Behaviour	0.68	1.00	0.63	0.69	0.53	0.37	0.40	0.27	0.12	0.41	0.29
Staff Guidance	0.69	0.63	1.00	0.65	0.65	0.38	0.52	0.36	0.06	0.49	0.43
Open-ended Qs	0.72	0.69	0.65	1.00	0.68	0.57	0.38	0.44	0.33	0.55	0.44
Staff Join Play	0.63	0.53	0.65	0.68	1.00	0.57	0.42	0.38	0.43	0.59	0.56
Chn can select activities	0.31	0.37	0.38	0.57	0.57	1.00	0.38	0.58	0.61	0.46	0.67
Print Saturated	0.36	0.40	0.52	0.38	0.42	0.38	1.00	0.24	0.17	0.55	0.64
Experiments	0.15	0.27	0.36	0.44	0.38	0.58	0.24	1.00	0.37	0.27	0.42
Imaginative Play	0.09	0.12	0.06	0.33	0.43	0.61	0.17	0.37	1.00	0.29	0.50
Stories told	0.37	0.41	0.49	0.55	0.59	0.46	0.55	0.27	0.29	1.00	0.63
Creativity	0.27	0.29	0.43	0.44	0.56	0.67	0.64	0.42	0.50	0.63	1.00
Equipment	0.47	0.51	0.44	0.57	0.54	0.71	0.51	0.31	0.44	0.45	0.53
Safety	0.26	0.35	0.22	0.26	0.20	0.32	0.26	0.15	0.11	0.20	0.20
Fine Motor Skills	0.15	0.36	0.52	0.47	0.38	0.66	0.51	0.52	0.29	0.47	0.59
Gross Motor Skills	0.16	0.22	0.14	0.39	0.38	0.75	0.28	0.54	0.60	0.45	0.59
Access to resources	0.25	0.17	0.07	0.37	0.38	0.66	0.04	0.37	0.60	0.18	0.38
Not Sex Stereotyped	0.35	0.38	0.42	0.33	0.30	0.16	0.18	0.31	0.18	0.20	0.29
Tikanga Māori	0.18	0.20	0.31	0.33	0.30	0.47	0.50	0.42	0.25	0.49	0.48
Cultures Recognised	0.06	0.00	0.16	0.17	0.26	0.32	0.31	0.47	0.17	0.30	0.39
Chn Support & Cooperate	0.40	0.37	0.33	0.36	0.38	0.31	0.19	0.19	0.32	0.24	0.29
Chn Complete Activities	0.29	0.24	0.27	0.40	0.45	0.58	0.02	0.44	0.35	0.07	0.15

	Equipment	Safety	Fine Motor Skills	Gross Motor Skills	Access to resources	Not Sex Stereo	Tikanga Maori Evident	Recog Of Culture	Ch Support & Coop	ChnCan Complete Activities
Staff Responsive	0.47	0.26	0.15	0.16	0.25	0.35	0.18	0.06	0.40	0.29
Staff Model Behaviour	0.51	0.35	0.36	0.22	0.17	0.38	0.20	0.00	0.37	0.24
Staff Guidance	0.44	0.22	0.52	0.14	0.07	0.42	0.31	0.16	0.33	0.27
Open-ended Qs	0.57	0.26	0.47	0.39	0.37	0.33	0.33	0.17	0.36	0.40
Staff Join Play	0.54	0.20	0.38	0.38	0.38	0.30	0.30	0.26	0.38	0.45
Chn can select activities	0.71	0.32	0.66	0.75	0.66	0.16	0.47	0.32	0.31	0.58
Print Saturated	0.51	0.26	0.51	0.28	0.04	0.18	0.50	0.31	0.19	0.02
Experiments	0.31	0.15	0.52	0.54	0.37	0.31	0.42	0.47	0.19	0.44
Imaginative Play	0.44	0.11	0.29	0.60	0.60	0.18	0.25	0.17	0.32	0.35
Stories told	0.45	0.20	0.47	0.45	0.18	0.20	0.49	0.30	0.24	0.07
Creativity	0.53	0.20	0.59	0.59	0.38	0.29	0.48	0.39	0.29	0.15
Equipments	1.00	0.53	0.60	0.57	0.47	0.26	0.28	0.04	0.48	0.38
Safety	0.53	1.00	0.30	0.30	0.22	0.32	0.14	0.02	0.39	0.15
Fine Motor Skills	0.60	0.30	1.00	0.55	0.24	0.23	0.39	0.19	0.29	0.19
Gross Motor Skills	0.57	0.30	0.55	1.00	0.66	0.19	0.36	0.34	0.17	0.27
Access to resources	0.47	0.22	0.24	0.66	1.00	0.10	0.14	0.16	0.23	0.62
Not Sex Stereotyped	0.26	0.32	0.23	0.19	0.10	1.00	0.24	0.17	0.44	0.13
Tikanga Māori	0.28	0.14	0.39	0.36	0.14	0.24	1.00	0.61	-0.01	0.17
Cultures Recognised	0.04	0.02	0.19	0.34	0.16	0.17	0.61	1.00	0.10	0.13
Chn Support & Cooperate	0.48	0.39	0.29	0.17	0.23	0.44	-0.01	0.10	1.00	0.37
Chn Complete Activities	0.38	0.15	0.19	0.27	0.62	0.13	0.17	0.13	0.37	1.00

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APPENDIX 4

SUMMARY OF ASSOCIATIONS BETWEEN AGE 10 COMPETENCIES AND FAMILY INCOME AT AGES 5, 6, 8 AND 10[104]

We analysed the movement of children in different income groups between ages 5 to 10, to see if there were different patterns for children from different income groups. We found that there was no association between family income level and children's movement over time for children whose family income was in the medium bracket ($30-$60,000). The tables below give the patterns for children in the low and high family brackets. When the Chi-squared value has a very low probability it suggests there is some association between family income levels and the distribution of children's scores.

Table D-1

Departures from expected percentages for Family Income at age 5

Combination of score and Family Income level at age 5 → Competency at age 10↓	Prob for Chi.Sq test	low score age 10 & low income age 5	low score age 10 & high income age 5	high score age 10 & low income age 5	high score age 10 & high income age 5
Curiosity	0.0496	-0.3	-7.8	-9.1	7.5
Perseverance	0.0001	15.3	-11.9	-15.3	8.4
Individual Responsibility	0.0073	8.8	-7.8	-12.5	6.2
Social Skills with Peers	0.0072	12.3	-7.0	-11.1	10.6
Social Skills with Adults	0.0283	8.3	-7.1	-7.7	5.0
Communication	0.0011	11.2	-11.0	-13.9	15.7
Mathematics	0.0001	12.4	-9.7	-13.6	12.7
PAT Comprehension	0.0000	13.6	-14.6	-11.5	16.8
Burt Word Recognition	0.0005	15.5	-12.1	-10.3	10.1
Writing	0.0185	8.1	-5.9	-8.3	11.4
Reading age	0.0000	11.9	-8.1	-18.8	18.6
Logical Problem-Solving	0.0000	18.5	-15.5	-15.3	19.0
Mean Composite Competency	0.0000	14.0	-15.4	-11.8	13.2
Mean Cognitive Composite	0.0000	14.3	-14.4	-15.1	15.7
Mean Social and Additional Composite	0.0002	11.6	-9.8	-12.6	13.6

For the Mean Composite Competency, low income children are over-represented in both quartile groups below the median and under-represented in both quartile groups above the median. High income children are over-represented in both quartile groups above the median.

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[104] This analysis was done as part of work on income and related family factors for the Ministry of Social Policy.

Table D-2

Departures from expected percentages for Family Income at age 6

Combination of score and Family Income level at age 6 → Competency at age 10↓	Prob for Chi.Sq test	low score age 10 & low income age 6	low score age 10 & high income age 6	high score age 10 & low income age 6	high score age 10 & high income age 6
Perseverance	0.0083	17.5	-15.9	-6.1	6.3
Social Skills with Adults	0.0491	5.1	-11.1	-8.7	7.7
Communication	0.0332	10.5	-10.3	-14.6	16.6
Fine Motor Skills	0.0168	1.6	-6.4	4.2	-10.2
PAT Reading Comprehension	0.0045	14.1	-16.0	-9.8	12.2
Logical Problem-Solving	0.0000	14.8	-22.3	-10.5	25.4
Mean Composite Competency	0.0018	11.3	-18.0	-9.2	9.6
Mean Cognitive Composite	0.0050	8.7	-14.7	-8.4	7.7
Mean Social and Additional Composite	0.0223	11.5	-11.1	-8.0	8.0

There are generally fewer significant departures here. This could be because we have smaller numbers of children in the sub-groups and so are less able to discriminate amongst them. On the other hand it could also be because age 6 income does not have as great an impact as age 5 income. The latter interpretation is consistent with the results of our other analyses.

Table D-3

Departures from expected percentages for Family Income at age 8

Combination of score and Family Income level at age 8 → Competency at age 10↓	Prob for Chi.Sq test	low score age 10 & low income age 8	low score age 10 & high income age 8	high score age 10 & low income age 8	high score age 10 & high income age 8
Perseverance	0.0001	9.1	-14.3	-9.5	9.2
Individual Responsibility	0.0007	6.9	-9.9	-7.5	1.2
Social Skills with Peers	0.0057	7.0	-8.8	-12.1	14.2
Social Skills with Adults	0.0003	9.3	-8.5	-9.0	11.1
Communication	0.0002	8.9	-11.0	-11.1	13.6
Mathematics	0.0007	6.8	-12.5	-8.8	10.0
PAT Reading Comprehension	0.0010	11.2	-14.5	-7.8	12.4
Burt Word Recognition	0.0008	10.3	-16.0	-6.3	13.1
Reading age	0.0002	10.1	-11.7	-6.8	18.7
Logical Problem-Solving	0.0001	9.6	-17.1	-8.2	18.9
Mean Composite Competency	0.0000	13.3	-20.5	-8.7	11.5
Mean Cognitive Composite	0.0000	8.1	-15.3	-8.9	11.5
Mean Social and Additional Composite	0.0000	10.1	-11.7	-9.4	11.9

Table D-4

Departures from expected percentages for Family Income at age 10

Combination of score and Family Income level at age 10 → Competency at age 10↓	Prob for Chi.Sq test	low score age 5 & low income age 10	low score age 5 & high income age 10	high score age 5 & low income age 10	high score age 5 & high income age 10
Perseverance	0.0154	5.3	-12.6	-7.5	13.5
Social Skills with Peers	0.0032	7.2	-10.1	-9.8	16.2
Social Skills with Adults	0.0049	3.8	-11.1	-4.8	7.6
Communication	0.0251	7.1	-12.2	-11.3	12.7
Mathematics	0.0005	5.7	-12.1	-7.4	13.2
PAT Reading Comprehension	0.0040	5.6	-16.0	-9.0	15.3
Burt Word Recognition	0.0063	5.7	-14.3	-4.1	12.6
Reading age	0.0001	9.1	-14.1	-10.2	21.0
Logical Problem-Solving	0.0132	4.3	-14.0	-9.8	11.9
Mean Composite Competency	0.0000	7.2	-17.8	-9.0	14.3
Mean Cognitive Composite	0.0000	4.0	-12.9	-8.2	15.9
Mean Social & Additional Composite	0.0004	5.1	-13.2	-9.5	12.3

High income children are under-represented in the lowest quartile group for 14 of these competency measures, low income children are under-represented in the top quartile group for 11 of these measures. We expect large departures in the composite scores as they "concentrate" our information. So if we exclude them from the count we have 11 competencies where high income children are under-represented in the lowest quartile group and 7 where the low income children are under-represented in the top quartile group.

There is virtually no over-representation of low income children in the lowest quartile group (the exception is for the Teacher's Perception of reading age). But over-representation of high income children in the top quartile is still common.

APPENDIX 5

MODERATE FACTORS—SUMMARY TABLES

Table E-1

Mathematics Score at age 10 – Factors showing moderate impact

Number of levels	Factor in order of association by size of largest observed significant sub-group difference ↓	Factor levels with generally low performance	Factor levels with middling performance	Factor levels with generally high performance	largest observed difference	s.e of given diff.	% variance acct.
2 levels	Home reading – encyclopaedia	no		yes	12.9	2.1	6.8
4 levels	Child gets bored at school	always	never	often/sometimes	12.6	6.4	1.7
3 levels	Child's rating for difficulty	high	medium	low	12.2	2.5	4.9
4 levels	Family income at age 10	≤$30K-50K	>$50K-70K	>$70K	11.7	2.8	4.8
3 levels	% Income spent on housing age 8	≥33%		≤25%	11.2	2.6	4.4
3 levels	Feeling doing well at school through having the highest test marks	disagree	agree	not sure	11.2	3.6	2.3
3 levels	At school, child feels sad	often	never	sometimes	11.2	4.6	1.6
3 levels	Child feels lonely at school	often	never	sometimes	11.0	4.9	2.4
3 levels	Hearing status at age 5	problem corrected or monitored/ hearing loss		no problems	10.9	4.5	3.1
3 levels	Child enjoys numbers	no/qual.yes		yes	10.8	3.0	3.5
4 levels	Parental support	little	some	good/fantastic	10.8	4.3	2.0
4 levels	ECE staff encouraged with open-ended questions	below median		above median	10.7	3.1	4.6
2 levels	Home maths - can use calculator for multiplication & division	no		yes	10.6	2.3	4.0
4 levels	Child gets told off at home	always	often/never	sometimes	10.6	3.8	1.6
3 levels	At school, treated OK	sometimes	always	often	10.5	3.4	2.0
2 levels	Child has lessons outside of school	no extra lessons		extra lessons	10.4	2.0	5.2
4 levels	Chn allowed time to complete activities at ECE	<4th quartile		4th quartile	10.3	3.8	3.2
2 levels	Child belongs to performing arts grp	no clubs		performing arts	10.2	3.6	5.0
3 levels	At school child gets all the help needed	always	sometimes	often	10.0	2.2	4.0
3 levels	Family makes sure the child does homework	sometimes/ always		often	10.0	4.6	1.7
4 levels	Child gets tired of trying at school	always	often/sometimes	never	10.0	4.7	1.9
2 levels	Child goes to public library	no		yes	9.9	2.7	2.6
2 levels	Home writing - reports (fact. writing)	no		yes	9.6	2.0	4.4
3 levels	At school, keeps out of trouble	sometimes	always	often	9.6	2.5	2.9
2 levels	Child belongs to service club	no clubs		service club	9.6	3.3	4.2
2 levels	Child plays a specific musical instrument	no		yes	9.5	2.1	4.3
4 levels	Child feels restless at school	often	never/always	sometimes	9.5	3.0	2.2
3 levels	% Income spent on housing age 5	≥33%		≤25%	9.5	3.5	4.1
3 levels	Child does interesting things at school	always	sometimes	often	9.4	2.3	3.6
2 levels	Sports lessons outside school	no extra lessons		sports lessons	9.4	2.6	3.5
4 levels	Chn selected own activities at ECE	<4th quartile		4th quartile	9.3	3.5	3.6
2 levels	Age 5 computer ownership	no		yes	9.2	2.7	4.2
4 levels	ECE duration	<36 months	36-47 mths	48 mths or more	9.2	3.7	3.1
2 levels	Home reading – dictionary	no		yes	9.2	3.7	3.0
2 levels	Home reading – teenage books	no		yes	9.0	2.3	3.1
					8.6		

Number of levels	Factor in order of association by size of largest observed significant sub-group difference ↓	Factor levels with generally low performance	Factor levels with middling performance	Factor levels with generally high performance	largest observed difference	s.e of given diff.	% variance acct.
2 levels	Parental aspirations for child	other		university/ tertiary		2.0	3.5
2 levels	Used home computer for graphics at age 8	no		yes	8.4	2.7	2.6
2 levels	Home reading – non-fiction	no		yes	8.3	2.4	2.3
2 levels	Used home computer for word processing at age 8	no		yes	8.2	2.4	3.0
2 levels	Plays musical instrument/participates in musical group	no		yes	8.1	2.0	3.1
3 levels	Home is a place where child does lots of good things with family	always		often	7.9	2.4	2.8
2 levels	Child sings in a choir	no		yes	7.9	3.0	2.1
2 levels	Used home computer for homework at age 8	no		yes	7.9	3.4	1.5
2 levels	Used CD Roms at age 8	no		yes	7.9	3.4	1.4
3 levels	Child enjoys self at school	always	sometimes	often	7.8	2.2	2.5
3 levels	% Income spent on housing age 10	≥50%		≤33%	7.8	2.9	1.8
3 levels	At school, teacher tells me when I do good work	sometimes	always	often	7.7	3.5	1.2
2 levels	Home writing - does word puzzles/crosswords	no		yes	7.6	2.5	1.9
4 levels	Starting age at ECE	36mths or more		<36 months	7.4	3.0	1.5
3 levels	Feeling doing well at school through having nothing hard to do	agree		disagree/unsure	7.3	2.2	2.4
4 levels	Relatives come to the home	always/never	sometimes	often	7.3	2.7	1.6
4 levels	Bullying	bully/bully & victim	victim	neither	7.3	3.6	1.8
3 levels	Home is a place where child has lots of interesting things to do	always		often	6.6	2.5	1.4
2 levels	Parental aspirations at age 5	other		university/ tertiary	6.5	2.9	1.8
2 levels	Home reading – adult books	no		yes	6.2	3.0	0.8
2 levels	Home writing - poems	no		yes	6.0	2.1	1.5

Table E-2

PAT Reading Comprehension – Factors showing moderate impact

Number of levels	Factor in order of association by size of largest observed significant sub-group difference ↓	Factor levels with generally low performance	Factor levels with Middling performance	Factor levels with generally high performance	largest observed difference	s.e of given diff.	% variance acct.
2 levels	Home maths - can use calculator for addition & subtraction	no		yes	11.9	4.0	1.8
3 levels	Feeling doing well at school through being made to think	disagree		agree/unsure	11.8	3.7	2.0
4 levels	ECE staff responsive	1st quartile	2nd quartile	>median	11.8	3.8	4.9
2 levels	Home maths - can work out fractions & proportions aside of ½ and ¼	no		yes	11.7	1.9	7.3
2 levels	Child enjoys patterns	no		yes/qual.yes	11.7	4.4	1.9
2 levels	Home maths - does times tables over 10	no		yes	11.5	1.9	7.1
2 levels	Child plays a specific musical instrument	no		yes	11.5	2.0	6.9
4 levels	ECE encourages gross motor skills	<4th quartile		4th quartile	11.2	3.8	3.5
2 levels	English 2nd language age 10	yes		no	11.2	5.0	1.0
3 levels	School ownership	state	state-integrated	private	11.1	3.9	1.7
2 levels	Home reading – encyclopaedia	no		yes	11.0	2.0	5.5
2 levels	Age 8 computer ownership	no		yes	10.9	2.1	5.2
2 levels	Child goes to public library	no		yes	10.9	2.6	3.5
3 levels	% Income spent on housing age 5	≥50%	33%	≤25%	10.9	3.4	4.1
4 levels	At school, I could do better work if I tried	always/often	sometimes	never	10.8	4.2	3.6
2 levels	Home reading - teenage books	no		yes	10.7	2.1	4.9
4 levels	ECE staff asked open-ended questions	below median		above median	10.6	3.1	5.0
4 levels	Child gets tired of trying at school	always	often	never/sometimes	10.6	4.3	2.3
4 levels	ECE staff joined chn in their play	<4th quartile		4th quartile	10.5	4.4	3.0
2 levels	Home maths - uses a ruler to measure accurately	no		yes	10.2	2.6	3.0
2 levels	Home writing - reports	no		yes	9.9	1.9	5.2
2 levels	Plays musical instrument or participates in musical group	no		yes	9.8	1.9	5.2
2 levels	Child plays in an orchestra/cultural group	no		yes	9.8	3.8	2.4
2 levels	Child sings in a choir	no		yes	9.6	2.8	3.6
4 levels	ECE safety	<4th quartile		4th quartile	9.6	3.7	3.6
3 levels	At school, treated OK	sometimes		always/often	9.4	3.2	1.9
2 levels	Home reading – non-fiction	no		yes	9.1	2.3	3.1
3 levels	At school, child keeps out of trouble	sometimes	often	always	9.0	2.4	3.1
2 levels	at 8 played games on computer	no		yes	8.9	4.7	1.0
2 levels	Age 5 computer ownership	no		yes	8.8	2.6	4.0
2 levels	Home reading – adult books	no		yes	8.8	2.8	1.9
2 levels	Parental aspirations for child	other		university/tertiary	8.7	1.9	4.1
2 levels	Home writing – plays	no		yes	8.6	2.7	1.9
3 levels	At school child gets all the help they need	sometimes	always	often	8.5	2.7	2.5
4 levels	Starting age at ECE	24 mths or more		<24 months	8.4	2.9	2.1
2 levels	Home maths - can use calculator for multiplication & division	no		yes	8.3	2.2	2.7
3 levels	Child enjoys self at school	always	sometimes	often	8.3	2.9	3.0
4 levels	Teacher's view of relationship with parent	good/none	satisfactory to difficult	v.good/excellent	8.2	3.3	2.8
2 levels	Child has lessons outside of school	no extra lessons		extra lessons	8.1	1.9	3.5
3 levels	Child does interesting things at school	sometimes	always	often	8.1	2.2	3.2

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Number of levels	Factor in order of association by size of largest observed significant sub-group difference ↓	Factor levels with generally low performance	Factor levels with Middling performance	Factor levels with generally high performance	largest observed difference	s.e of given diff.	% variance acct.
3 levels	% Income spent on housing age 10	≥50%		≤33%	7.9	2.7	2.2
4 levels	Bullying	bully/bully & victim	victim	neither	7.5	3.5	1.7
3 levels	% Income spent on housing age 8	≥33%		≤25%	7.4	2.4	2.8
2 levels	Used graphics on home computer at age 8	no		yes	7.4	2.4	2.7
2 levels	Home reading – homework	no		yes	7.4	3.0	1.2
2 levels	Home maths - uses a scales to weigh accurately	no		yes	7.3	1.9	2.8
2 levels	Sports lessons outside of school	no extra lessons		sports lessons	7.3	2.4	2.5
2 levels	Child belongs to performing arts grp	no clubs		performing arts	7.3	3.3	3.0
2 levels	Used home computer for desktop publishing at age 10	no		yes	7.1	3.7	0.9
2 levels	Gender	male		female	7.0	1.9	2.6
2 levels	Child enjoys writing	no		yes/qual.yes	6.9	2.5	2.4
2 levels	Home writing - letters to family & friends	no		yes	6.8	2.1	2.1
3 levels	Home is a place where child does lots of good things with family	sometimes		often	6.7	2.3	1.9
2 levels	Home writing – poems	no		yes	6.5	2.0	2.0
2 levels	Used home computer to read CD Roms at age 8	no		yes	6.5	2.7	1.6
3 levels	Child feels lonely at school	often/never		sometimes	6.3	2.0	2.1
2 levels	Home reading – dictionary	no		yes	6.3	2.3	1.5
3 levels	Home is a place where child has lots of interesting things to do	sometimes		often	6.3	2.3	1.7
3 levels	Child learns most things quickly at school	sometimes		always/often	6.3	2.4	1.5
2 levels	Parental aspirations at age 5	other		university/tertiary	6.2	2.9	1.7
2 levels	Used home computer for word processing at age 8	no		yes	6.1	2.4	1.8
2 levels	Child enjoys numbers	no or qual.yes		yes	6.1	3.0	1.1

Table E-3

Perseverance Score — Factors showing moderate impact

Number of levels	Factor in order of association by size of largest observed significant sub-group difference ↓	Factor levels with generally low performance	Factor levels with middling performance	Factor levels with generally high performance	largest observed difference	s.e of given diff.	% variance acct.
2 levels	Home maths - adds money correctly	no		yes	12.9	3.4	2.8
3 levels	Paternal occupation when child is 10	unskilled	skilled	professional	12.7	3.3	4.0
4 levels	Family income at age 5	≤$30K	>$30K-$70K	>$70K	12.2	2.5	5.4
4 levels	Child gets bored at school	always	often	sometimes/never	12.2	4.9	1.7
5 levels	Child daily TV watching, age 8	≥2 hours	<2 hours	none	12.2	5.1	4.0
3 levels	Child's rating of their class for difficulty	high	medium	low	12.1	2.1	6.2
3 levels	Child enjoys writing	no		yes/qual.yes	12.0	2.0	8.1
4 levels	At school, teacher treats me fairly	sometimes/never	often	always	12.0	2.7	4.2
5 levels	Frequency of getting books from public library	irregular or don't know		three weekly	12.0	3.1	3.7
4 levels	Relatives come to the home	never	always/ sometimes	often	11.7	4.5	2.0
2 levels	Child plays in an orchestra/cultural group	no		yes	11.6	3.5	3.8
4 levels	Family income at age 8	≤$50K	>$50K-$70K	>$70K	11.4	2.3	6.0
2 levels	Home reading – instructions	no		yes	11.4	2.6	3.7
3 levels	Child gets help at home if help needed	sometimes	always	often	11.0	2.8	3.1
4 levels	Socio-economic mix of ECE	low income	wide/low-middle income	middle-class	11.0	4.0	3.4
2 levels	Home maths - does times tables over 10	no		yes	10.9	1.7	7.7
2 levels	Home maths - can use calculator for addition & subtraction	no		yes	10.8	3.4	2.0
2 levels	Gender	male		female	10.6	1.7	7.3
2 levels	Child belongs to performing arts grp	no clubs		performing arts	10.6	3.0	7.6
3 levels	Feeling doing well at school through solving a problem by working hard	disagree	not sure	agree	10.6	4.6	1.4
2 levels	Home maths - can work out halves & quarters	no		yes	10.5	2.6	3.2
6 levels	Mother's qualification	none to senior school	trade	tertiary/ university	10.4	2.6	4.6
2 levels	Home reading – fiction	no		yes	10.4	2.9	2.5
4 levels	Teacher's view of relationship with parent	satisfactory to difficult/none	good	v.good/excellent	10.3	2.6	4.1
4 levels	Available income per person in household	up to $3800	in between	>$8900	10.3	2.6	3.6
3 levels	Child gets upset at school	often	sometimes	never	10.3	3.8	2.0
3 levels	School attendance	poor	satisfactory	good	10.2	3.7	1.9
2 levels	Performing arts lessons out of school	no extra lessons		perf.arts lessons	9.9	2.0	5.9
4 levels	Child feels restless at school	often	never/always	sometimes	9.9	2.6	2.8
2 levels	Fine arts lessons out of school	no extra lessons		fine arts lessons	9.8	4.8	1.6
2 levels	Home writing - reports	no		yes	9.7	1.7	5.9
3 levels	Child's initial response to school	while to settle	matter-of-fact or unhappy	enthusiasm	9.6	2.9	4.6
3 levels	% Income spent on housing age 5	50% or more	33%	≤25%	9.6	3.0	4.3
2 levels	Child plays a specific musical instrument	no		yes	9.5	1.8	5.8
3 levels	I can learn what I need for my future	sometimes	always	often	9.2	2.9	2.5
2 levels	English 2nd language age 10	yes		no	9.2	4.6	0.8
2 levels	Home maths - tells time correctly	no		yes	9.1	2.9	1.9

Number of levels	Factor in order of association by size of largest observed significant sub-group difference ↓	Factor levels with generally low performance	Factor levels with middling performance	Factor levels with generally high performance	largest observed difference	s.e of given diff.	% variance acct.
3 levels	At school, teacher tells me when I do good work	sometimes	always	often	9.0	3.0	1.9
2 levels	Home writing – plays	no		yes	8.9	2.5	2.5
2 levels	Home reading - encyclopaedia	no		yes	8.8	1.9	4.2
3 levels	Child enjoys patterns	no/qual.yes		yes	8.8	2.8	3.1
3 levels	% Income spent on housing age 8	≥50%	33%	≤25%	8.7	2.2	3.6
2 levels	Child upset due to school	yes		no upsets	8.7	3.9	1.4
2 levels	Plays musical instrument/participates in musical group	no		yes	8.5	1.7	4.7
2 levels	Home maths - uses a ruler to measure accurately	no		yes	8.5	2.3	2.6
3 levels	Teacher listens to what the child says	sometimes		always/often	8.1	2.5	2.5
4 levels	Family income at age 10	≤$30K	>$30K-70K	>$70K	8.0	2.6	2.0
2 levels	Change - accident/illness/surgery for family member	yes		no changes	8.0	3.3	2.8
2 levels	Child sings in a choir	no		yes	7.8	2.6	2.8
3 levels	Teacher helps child to do her/his best	sometimes		always/often	7.8	3.0	1.4
2 levels	Age 10 computer ownership	no		yes	7.7	2.1	2.6
2 levels	Home maths - can work out fractions & proportions aside of ½ and ¼	no		yes	7.5	1.7	3.6
3 levels	Child enjoys numbers	no/qual.yes		yes	7.3	2.4	2.3
3 levels	At school child gets bullied	often	sometimes	never	7.3	3.6	1.5
2 levels	Used computer for graphics at age 8	no		yes	7.0	2.2	2.8
4 levels	Housing stability	4 or more shifts		up to 3 shifts	7.0	2.8	1.5
3 levels	Health at age 10	good	fair to poor	excellent	6.8	1.9	2.6
3 levels	Child does interesting things at school	sometimes	always	often	6.8	2.2	2.1
3 levels	Feeling doing well at school through doing very best	disagree/agree		not sure	6.8	2.5	1.5
3 levels	% Income spent on housing age 10	≥50%		≤33%	6.7	2.7	1.8
3 levels	At school child gets all the help they need	sometimes	always	often	6.3	2.4	1.3
2 levels	Used home computer for CD Roms at age 8	no		yes	6.2	2.5	1.8
2 levels	Home writing – poems	no		yes	6.0	1.8	2.1
2 levels	Child has lessons outside school	no extra lessons		extra lessons	5.6	1.7	2.0
3 levels	Child talks to parents about what they are reading	no		yes/sometimes	5.6	2.1	2.2
2 levels	Used home computer to play games at age 10	yes		no	5.6	2.9	1.0
2 levels	Home maths - uses a scales to weigh accurately	no		yes	5.5	1.8	1.9
2 levels	Age 8 computer ownership	no		yes	5.5	1.9	1.6
2 levels	Used home computer to play games at age 8	yes		no	5.4	2.5	1.3
2 levels	Home writing – long stories	no		yes	5.2	2.2	1.1
2 levels	Home reading – dictionary	no		yes	5.1	2.1	1.2
2 levels	Home maths – can use calculator for multiplication & division	no		yes	5.0	2.0	1.2
3 levels	ECE combinations	2 or more sequentially	2 or more concurrently	one	5.0	2.1	1.1

Table E-4

Communication Score – Factors showing moderate impact

Number of levels	Factor in order of association by size of largest observed significant sub-group difference ↓	Factor levels with generally low performance	Factor levels with middling performance	Factor levels with generally high performance	largest observed difference	s.e of given diff.	% variance acct.
6 levels	Parental TV watching when child 8	≥4 hours	<4 hours	none	12.9	4.5	2.0
4 levels	Child gets listened to at home	never	often/sometimes	always	12.6	5.2	2.0
3 levels	Feeling doing well at school through hard work	disagree	not sure	agree	12.4	4.8	3.1
4 levels	Child feels lonely at home	often	always	sometimes/ never	12.3	4.4	1.7
2 levels	Home reading – instructions	no		yes	12.1	2.2	5.8
2 levels	Home reading – fiction	no		yes	12.1	2.4	4.9
4 levels	Socio-economic mix of ECE	low-income	wide mix	low-middle income/middle-class	12.1	3.9	4.6
9 levels	Changes in family income	low->$50K	other movements	high to high	12.0	3.9	5.4
3 levels	Feeling doing well at school through solving a problem by working hard	disagree	not sure	agree	11.9	4.1	2.4
5 levels	Child daily TV watching age 8	≥2 hours	1 – (2) hrs	none	11.7	4.5	3.9
6 levels	Mother's qualification	none	the rest	university	11.4	2.4	6.1
2 levels	Fine arts lessons outside of school	no extra lessons		fine arts lessons	11.4	3.6	3.6
4 levels	Family asks child about school	never	sometimes	always/often	11.4	4.1	2.8
3 levels	Maternal occupation at birth of 1st child	unskilled	skilled	professional	11.3	3.3	3.8
4 levels	Child helps out at home	never	always/ sometimes	often	11.3	5.7	2.4
3 levels	Child's rating of their class for difficulty	high	medium	low	11.2	1.7	8.4
2 levels	Home maths - adds money correctly	no		yes	11.1	3.1	2.4
2 levels	English 2nd language age 5	yes		no	11.0	3.8	1.6
2 levels	Home maths - can work out halves & quarters	no		yes	10.8	2.3	4.3
4 levels	Teacher's view of relationship with parent	satisfactory/ difficult/none	good	v.good/excellent	10.8	2.5	5.4
2 levels	Home maths - does times tables up to 10	no		yes	10.5	1.7	7.1
3 levels	Child gets help at home if help needed	sometimes		always/often	10.4	2.1	4.9
4 levels	Child's Ethnicity	Pacific Island		Maori/Asian/ Pakeha	10.4	3.4	2.2
3 levels	Child's initial response to school	while to settle	matter-of-fact/ unhappy	enthusiasm	10.3	2.2	7.9
4 levels	Family income at age 5	≤$30K	>$30K-$70K	>$70K	10.2	2.0	5.3
3 levels	Paternal occupation at birth of 1st child	unskilled	skilled	professional	10.2	3.3	4.4
6 levels	Parental TV watching when child 10	≥4 hours	3 – (4) hours	<3 hours	10.2	3.9	2.3
5 levels	School decile	"1-2"	the rest	"3-4"	10.0	3.0	2.8
3 levels	At school, teacher tells me when I do good work	sometimes	always	often	9.9	2.4	3.3
3 levels	Child gets things explained at home when needed	sometimes	often	always	9.9	2.5	3.1
3 levels	Child enjoys writing	no		yes/qual.yes	9.7	1.9	7.9
3 levels	Child has good friends at school	sometimes		often/always	9.7	3.8	1.6
4 levels	Family income at age 8	≤$50K	>$50K-$70K	>$70K	9.3	1.9	5.8
4 levels	Bullying	bully & victim	bully/victim	neither	9.2	2.6	3.6
5 levels	Frequency of getting books from public library	irregular/don't know		three weekly	9.2	2.7	3.3
2 levels	Performing arts lessons out of school	no extra lessons		perf.arts lessons	9.0	1.6	7.7

Number of levels	Factor in order of association by size of largest observed significant sub-group difference ↓	Factor levels with generally low performance	Factor levels with middling performance	Factor levels with generally high performance	largest observed difference	s.e of given diff.	% variance acct.
4 levels	Available income per person in household	up to $3800	in between	>$8900	8.9	2.0	4.6
4 levels	At school, teacher treats me fairly	sometimes/ never	often	always	8.9	2.3	3.3
4 levels	At school, I could do better work if I tried	always/often	sometimes	never	8.9	3.0	4.2
2 levels	Child belongs to performing arts grp	no clubs		performing arts	8.8	2.5	7.3
2 levels	Home writing - reports (factual writing)	no		yes	8.7	1.4	6.9
3 levels	At school, child keeps out of trouble	sometimes	often	always	8.7	1.8	4.7
2 levels	Child upset due to being picked on	yes		no upsets	8.7	4.1	1.3
3 levels	Teacher helps child to do her/his best	sometimes		always/often	8.3	2.7	2.1
2 levels	Child plays in an orchestra/cultural group	no		yes	8.2	2.8	3.0
3 levels	I can learn what I need for my future	sometimes	always	often	8.0	2.3	2.4
3 levels	At school child gets all the help they need	sometimes	always	often	7.9	2.1	3.0
2 levels	Home maths - tells time correctly	no		yes	7.9	2.7	1.7
2 levels	Child plays a specific musical instrument	no		yes	7.8	1.4	6.5
4 levels	Family income at age 10	≤$30K	>$30K-70K	>$70K	7.8	2.0	3.1
2 levels	Home maths - does times tables over 10	no		yes	7.6	1.4	5.8
2 levels	Home maths - can use calculator for addition & subtraction	no		yes	7.6	3.4	1.0
3 levels	Feeling doing well at school through being made to think	disagree	not sure	agree	7.5	2.0	1.4
3 levels	Paternal occupation when child is 10	unskilled	skilled	professional	7.5	2.5	2.7
2 levels	Gender	male		female	7.4	1.4	5.4
2 levels	Home maths - uses a ruler to measure accurately	no		yes	7.4	1.9	2.8
4 levels	Child feels restless at school	often	never/always	sometimes	7.4	2.1	2.5
4 levels	ECE duration	<36 months		36 mths or more	7.4	3.0	3.4
3 levels	Maternal occupation when child is 10	unskilled	skilled	professional	7.3	2.4	2.5
2 levels	Home maths - plays board games	no		yes	7.3	3.3	1.0
2 levels	Home reading - encyclopaedia	no		yes	7.2	1.5	4.3
2 levels	Home writing - poems	no		yes	7.1	1.5	4.2
2 levels	Plays musical instrument/participates in musical group	no		yes	7.0	1.3	5.2
3 levels	At school, treated OK	sometimes		always/often	7.0	2.3	2.1
3 levels	% Income spent on housing age 5	>33%		≤25%	6.9	2.6	3.0
3 levels	Child gets upset at school	often	sometimes	never	6.9	3.0	1.2
2 levels	Home reading - teenage books	no		yes	6.8	1.6	3.4
3 levels	Teacher listens to what the child says	sometimes		always/often	6.8	2.1	2.2
4 levels	Child gets tired of trying at school	often	always/ sometimes	never	6.8	2.2	2.1
3 levels	Child enjoys patterns	no/qual.yes		yes	6.8	2.4	2.0
2 levels	Age 10 computer ownership	no		yes	6.4	1.7	2.9
2 levels	Home maths - can work out fractions & proportions aside of ½ and ¼	no		yes	6.3	1.4	4.1
2 levels	Child sings in a choir	no		yes	6.3	1.9	3.2
2 levels	**Home writing – poems**	**no**		**yes**	6.2	1.9	2.0
3 levels	At school child gets bullied	often	sometimes	never	6.2	2.9	1.9
2 levels	Age 8 computer ownership	no		yes	6.1	1.5	3.2
2 levels	Home reading – dictionary	no		yes	6.1	1.8	2.2
2 levels	Child goes to public library	no		yes	5.8	2.0	1.[illegible]

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Number of levels	Factor in order of association by size of largest observed significant sub-group difference ↓	Factor levels with generally low performance	Factor levels with middling performance	Factor levels with generally high performance	largest observed difference	s.e of given diff.	% variance acct.
5 levels	Child daily TV watching age 10	≥2 hours		<2 hours	5.8	2.6	2.4
3 levels	Child does interesting things at school	sometimes	always	often	5.7	1.7	2.5
2 levels	Used computer for graphics at age 8	no		yes	5.5	1.8	2.4
2 levels	Age 5 computer ownership	no		yes	5.5	2.0	2.8
3 levels	Feeling doing well at school through having the highest test marks	disagree	agree	not sure	5.4	2.2	1.2
2 levels	Child has lessons outside school	no extra lessons		extra lessons	5.3	1.4	2.9
3 levels	% Income spent on housing age 8	≥50%	33%	≤25%	5.1	1.8	1.6
2 levels	Child belongs to service club	no clubs		service club	5.0	2.4	2.3

Table E-5

Individual Responsibility Score – Factors showing moderate impact

Number of levels	Factor in order of association by size of largest observed significant sub-group difference ↓	Factor levels with generally low performance	Factor levels with middling performance	Factor levels with generally high performance	largest observed difference	s.e of given diff.	% variance acct.
2 levels	Home maths – does times tables up to 10	no		yes	11.8	2.0	6.5
3 levels	Maternal occupation at birth of 1st child	unskilled	skilled	professional	11.7	3.9	4.9
3 levels	Child's rating of their class for difficulty	high	medium	low	11.3	2.0	6.6
4 levels	Relatives come to the home	never	always/ sometimes	often	11.3	4.3	1.6
3 levels	Hearing status at age 5	monitored/loss		no problems/ problem corrected	10.8	3.7	3.4
5 levels	Frequency of getting books from public library	irregular/don't know		three weekly	10.7	3.0	4.2
2 levels	Home maths - adds money correctly	no		yes	10.4	3.3	1.9
2 levels	Child belongs to performing arts grp	no clubs		performing arts	10.3	3.1	6.7
2 levels	Home maths - can work out halves & quarters	no		yes	10.2	2.5	3.2
4 levels	At school, I could do better work if I tried	always/often	sometimes	never	10.2	3.7	2.9
3 levels	Feeling doing well at school through hard work	disagree	not sure	agree	10.2	4.9	1.6
3 levels	Paternal occupation at birth of 1st child	unskilled	skilled	professional	10.0	4.1	2.9
3 levels	Feeling doing well at school through solving a problem by working hard	disagree	not sure	agree	9.7	4.4	1.2
2 levels	Home writing – plays	no		yes	9.5	2.4	3.0
2 levels	Home reading – instructions	no		yes	9.5	2.5	2.7
4 levels	Child's initial response to school	while to settle	matter-of-fact/ unhappy	enthusiasm	9.5	2.8	4.6
2 levels	Changes – parental stress/relationship problems	yes		no changes	9.5	4.9	2.2
3 levels	At school, teacher tells me when I do good work	sometimes	always	often	9.4	2.9	2.2
2 levels	English 2nd language age 10	yes		no	9.1	4.4	0.8
2 levels	Child plays in an orchestra/cultural group	no		yes	9.0	3.4	2.4
4 levels	Family income at age 5	≤$30K	>$30K-$70K	>$70K	8.9	2.5	3.3
2 levels	Home writing – reports	no		yes	8.8	1.7	5.3
2 levels	Home writing - letters to fam&friends	no		yes	8.6	1.8	4.3
2 levels	Child plays a specific musical instrument	no		yes	8.5	1.8	5.0
3 levels	Teacher listens to what the child says	sometimes		always/often	8.5	2.4	2.8
4 levels	Family income at age 8	≤$50K		>$50K	8.5	2.5	4.5
4 levels	Child feels restless at school	often	always	sometimes/ never	8.3	2.5	2.4
2 levels	Performing arts lessons out of school	no extra lessons		perf.arts lessons	8.2	1.9	4.3
5 levels	Child daily TV watching, age 8	>2 hours		up to 2 hours	8.2	2.3	3.0
4 levels	ECE staff guided chn	1st quartile		2nd, 3rd or 4th quartile	8.2	3.1	2.7
2 levels	Home reading – encyclopaedia	no		yes	8.1	1.8	3.8
2 levels	Home maths - uses a ruler to measure accurately	no		yes	8.1	2.3	2.5
3 levels	I can learn what I need for my future	sometimes	always	often	8.1	2.9	2.[illegible]
9 levels	Changes in family income	low - >30-50K	other movements	high to high	8.1	3.5	3.[illegible]

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Number of levels	Factor in order of association by size of largest observed significant sub-group difference ↓	Factor levels with generally low performance	Factor levels with middling performance	Factor levels with generally high performance	largest observed difference	s.e of given diff.	% variance acct.
4 levels	Available income per person in household	up to $3800	in between	>$8900	8.0	2.6	2.4
3 levels	Teacher helps child to do her/his best	sometimes		always/often	7.9	2.9	1.5
2 levels	Plays musical instrument/participates in musical group	no		yes	7.8	1.7	4.2
2 levels	Home maths – does times tables over 10	no		yes	7.8	1.7	4.3
2 levels	Child sings in a choir	no		yes	7.8	2.5	2.9
2 levels	School-related lessons out of school	no extra lessons		school-related lessons	7.7	3.5	1.7
3 levels	Child gets help at home if help needed	sometimes		always/often	7.6	2.4	2.0
4 levels	Child gets tired of trying at school	always/often		never/sometimes	7.6	2.7	2.1
3 levels	School attendance	poor	satisfactory	good	7.6	3.6	1.3
2 levels	Used home computer to play games at age 8	yes		no	7.5	2.4	2.7
3 levels	Paternal occupation when child is 10	unskilled	skilled	professional	7.3	3.1	1.9
3 levels	% Income spent on housing age 5	33% or more		≤25%	6.9	3.0	2.5
4 levels	Family income at age 10	≤$30K		>$30K	6.8	2.5	1.6
2 levels	Home writing - poems	no		yes	6.7	1.8	2.8
2 levels	Used home computer for graphics at age 8	no		yes	6.5	2.1	2.6
2 levels	Age 10 computer ownership	no		yes	6.5	2.1	1.9
2 levels	Home reading – dictionary	no		yes	6.3	2.0	2.0
2 levels	Home writing - does word puzzles/ crosswords	no		yes	6.0	2.1	1.6
4 levels	Family stability	2 parent to 1 parent	2 parent to new 2 parent	original 1 or 2 parent family	6.0	2.2	1.6
3 levels	Child enjoys numbers	no/qual.yes		yes	6.0	2.6	1.3
3 levels	Household size	2 or 3		4 or more	5.9	2.2	1.5
2 levels	Home maths – tells time correctly	no		yes	5.9	2.9	0.8
2 levels	Home writing – short stories	no		yes	5.8	1.7	2.2
3 levels	Combination of ECEs	2 or more seq.	2 or more conc.	one	5.7	2.1	1.6
2 levels	Home writing – long stories	no		yes	5.7	2.1	1.4
2 levels	Used home computer for CD Roms at age 8	no		yes	5.7	2.3	1.6
3 levels	Feeling doing well at school through having nothing hard to do	agree	disagree	not sure	5.7	2.4	1.1
2 levels	Child belongs to service club	no clubs		service club	5.7	2.8	2.1
3 levels	Feeling doing well at school through knowing more than other people	agree	not sure	disagree	5.6	1.8	1.8
3 levels	Child enjoys patterns	no/qual.yes		yes	5.4	2.7	1.4
3 levels	% Income spent on housing age 8	33% or more		≤25%	5.3	2.1	1.6
2 levels	Home writing - keeps a journal/diary	no		yes	5.0	1.7	1.7